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TRANSCRIPT OF RECORD.

SUPREME COURT OF THE UNITED STATES.

Nos. ~~636~~ and ~~637~~.
116, 117

THE RICHMOND MINING COMPANY OF NEVADA ET AL., APPELLANTS,

636. *vs.*

THE EUREKA CONSOLIDATED MINING COMPANY,

AND

THE RICHMOND MINING COMPANY OF NEVADA, APPELLANTS,

637. *vs.*

THE EUREKA CONSOLIDATED MINING COMPANY.

APPEALS FROM THE CIRCUIT COURT OF THE UNITED STATES FOR THE DISTRICT OF NEVADA.

FILED JANUARY 17, 1878.

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with all the dips, spurs, angles, off-shoots, out-crops, depths, widths, and variations thereof, and all the minerals and other valuables therein contained.

And also that portion of said lode before mentioned and that portion of all lodes, veins, and ledges bearing silver and other valuable minerals, throughout their entire depth, the top or apex of which lies inside of the said surface lines, extended downward vertically, lying between vertical planes drawn downward through the following described end lines, to wit: a line passing through said point on said lode, whence the north corner of United States Survey Number 38 of said Eureka Mining District bears north 38 deg. east, forty-seven (47) feet, and extending from said point north 38 deg. east, and south 38 deg. west, and a line parallel to said line passing through a point which is south 52 deg. east, twelve hundred and fifty (1250) feet distant from the said point whence the north corner of United States Survey Number 38 of said Eureka Mining District bears north 38 deg. east, forty-seven (47) feet.

Also all that surface ground, within which said said portion of said lode first hereinbefore mentioned has its top or apex, beginning at a point whence the north corner of United States Survey Number 38 of said Eureka Mining District bears north 38 deg. east, forty-seven (47) feet, and running thence north 38 deg. east, four hundred and forty-seven (447) feet; thence south 52 deg. east, four
2 hundred and fifty-one and two-tenths (451 2-10) feet; thence north 65¼ deg. east, fifty (50) feet; thence south 67 deg. east, three hundred and forty-one (341) feet; thence south 73½ deg. east, one hundred and one (101) feet; thence south 8 deg. east, two hundred and fifty (250) feet; thence south 9¾ deg. east, sixty-eight (68) feet; thence south 38 deg. west, two hundred and fifty-four (254) feet; thence north 76¾ deg. west, one hundred and ten (110) feet; thence north 52 deg. west, seventy-seven and one-half (77½) feet; thence south 38 deg. west, fifty (50) feet; thence south 52 deg. east, three hundred (300) feet; thence south 38 deg. west, two hundred (200) feet; thence north 52 deg. west, three hundred (300) feet; thence south 38 deg. west, one hundred (100) feet; thence north 52 deg. west, seven hundred and eighty-five and four-tenths (785 4-10) feet; thence north 28½ deg. east, one hundred and one and four-tenths (101 4-10) feet; thence north 52 deg. west, one hundred and forty-seven and eight tenths (147 8-10) feet; thence north 38 deg. east, one hundred and fifty-three (153) feet, to the point of beginning;

And that portion of all lodes, veins, and ledges bearing silver and other valuable minerals, throughout their entire depth, the top or apex of which lies inside of said surface lines extended downward vertically, lying between vertical planes drawn downward through the said end lines, to wit: the line passing through said point whence the north corner of United States Survey Number 38 of said Eureka Mining District bears north 38 deg. east, forty-seven (47) feet, and

extending north 38 deg. east, and south 38 deg. west; and the line parallel to said line, passing through a point which is south 52 deg. east, twelve hundred and fifty (1250) feet, distant from the said point whence the north corner of United States Survey Number 38 of said Eureka Mining District bears north 38 deg. east, forty-seven (47) feet; except that portion of said premises, lode, vein, and ore thereof, contained, included, enclosed, and confined within the following surface lines drawn downward vertically, to wit: beginning at a point whence the northwest corner of the Buckeye or southwest corner of the Champion bears south 52 deg. east, two hundred and two and two-tenths (202 2-10) feet; running thence north 52 deg. west, one hundred and forty-seven and eight-tenths (147 8-10) feet; thence north 38 deg. east, one hundred and fifty-thre (153) feet, and thence south 6 deg. east, two hundred and twelve and eight-tenths (212 8-10) feet, to the point of beginning.

And your orator further shows to your honors that the United States of America granted to complainant by patent, a copy of which is hereunto attached and made a part of this bill, marked "Exhibit A," a portion of said property and premises, to wit: That portion thereof described and embraced in said patent; and that the United States of America granted to complainant by patent, a copy of which is hereunto attached and made a part of this bill, marked "Exhibit B," a portion of said property and premises, to wit: That portion thereof described and embraced in said patent; and that the United States or America granted to complainant by patent, a copy of which is hereunto attached and made a part of this bill, marked "Exhibit C," a portion of said property and premises, to wit: That portion thereof described and embraced in said patent; and that the United States of America granted to complainant by patent, a copy of which is hereunto attached and made a part of this bill, marked "Exhibit D," a portion of said property and premises, to wit: That portion thereof described and embraced in said patent; and that the United States of America granted to complainant by patent, a copy of which is hereunto attached and made a part of this bill, marked "Exhibit E," a portion of said property and premises, to wit: That portion thereof described and embraced in said patent; and that the United States of America granted to complainant by patent, a copy of which is hereunto attached and made part of this bill, marked "Exhibit F," a portion of said property and premises, to wit: That portion thereof described and embraced in said patent; and that the United States of America granted to complainant by patent, a copy of which is hereunto attached and made a part of this bill, marked "Exhibit G," a portion of said property and premises, to wit: That portion thereof described and embraced in said patent.

And your orator further shows to your honors that complainant owns and holds all that portion of said property and premises not described and embraced in said patents, and has owned and held the same for more than five years next preceding the commence-

ment of this suit, in the manner required by the laws and regulations of the said mining district in which they were situated, and in conformity with all laws applicable thereto prescribing the mode of holding and possessing the public mineral land of the United States.

And your orator further shows to your honors that prior to and on the 26th day of April, A. D. 1871, complainant owned and possessed certain mining claims and locations called the Nuget, the Champion, the Lookout, the At Last, the Buckeye, and others, and has continued to own and possess them, except as hereinafter mentioned, and that said Nuget claim was and is the property and premises granted to complainant by said patent marked "Exhibit C;" and that said Champion claim was and is the property and premises granted to complainant by said patent marked "Exhibit A;" and that said At Last claim was and is the property and premises granted to complainant by said patent marked "Exhibibit B;" and that said Buckeye claim was and is the property granted to complainant by said patent marked "Exhibit E;" and that said Lookout claim was granted by the United States of America to complainant by its patent issued on the 16th day of July, A. D. 1872.

3 And your orator further shows to your honors, that prior to and on said 26th day of April, A. D. 1871, complainant held and possessed the property, premises, and lode called the Champion, granted as aforesaid, in and by said patent, marked "Exhibit A," in the manner required by the laws and regulations of the said mining district in which they were situated, and in conformity with all laws applicable thereto prescribing the mode of holding and possessing the public mineral land of the United States, and that complainant so held and possessed the same under and by a location of the said lode, ledge, or deposit running thereon four hundred feet, with all dips, spurs, angles, and variations; and that on and prior to said 26th day of April, A. D. 1871, the Richmond Mining Company, a corporation, held and possessed a mining claim adjacent thereto and on the northwest thereof, called the Richmond, under and by virtue of a location thereof as seven locations of one hundred feet square, and also as seven locations of two hundred feet each on the ledge, and that the mining laws then in force in said Eureka Mining District provided for the location of claims one hundred feet square, and embracing all the mineral therein to an indefinite depth, and also for the location of ledge claims two hundred feet each on the ledge, with all dips, spurs, and angles connecting with the ledge; and that a controversy arose between the complainant and the said Richmond Mining Company concerning the boundaries of said Champion and Richmond claims, and that a compromise and settlement of said controversy was made on the 26th day of April, A. D. 1871, in consideration and pursuance of which a deed was made, executed, and delivered by complainant to the said Richmond Mining Company, a copy of which

is attached hereunto and made a part of this bill, marked "Exhibit I," by which deed complainant conveyed to said Richmond Mining Company that portion of said premises, lode, vein, and ore contained, included, enclosed, and confined within the following surface lines drawn downward vertically, to wit: Beginning at a point whence the northwest corner of the Buckeye, or southwest corner of the Champion, bears south 52 deg. east, two hundred and two and two-tenths (202 2-10) feet; running thence north 52 deg. west, one hundred and forty-seven and eight-tenths (147 8-10) feet; thence north 38 deg. east, one hundred and fifty-three (153) feet, and thence south 6 deg. east, two hundred and twelve and eight-tenths (212 8-10) feet to the point of beginning; the same being a triangle claimed by said Richmond Mining Company, and claimed by complainant, and included within the lines of the said Champion claim, and granted to complainant in said patent, marked "Exhibit A," as aforesaid; and in said compromise and settlement and deed it was expressly agreed that said deed did not convey any ores, precious metals, veins, lodes, or deposits, dips, spurs, or angles not embraced within said triangular boundaries; and it was agreed and covenanted by the Richmond Mining Company, for itself, its successors and assigns, that the said Richmond Mining Company, its successors and assigns, would make no claim thereafter to any ground, or ore, or metals therein embraced within the Nuget, Champion, Lookout, At Last, Margaret, and other mining claims and locations at that time owned and possessed by the complainant, except that contained within the limits of the said triangular piece of ground; and the possession of said triangular piece of ground was delivered with said deed by complainant to said Richmond Mining Company; and said deed was duly recorded in the office of the recorder of the county in which said triangle was situated, on the 4th day of May, A. D. 1871; and the defendant, the Richmond Mining Company of Nevada, has received and has vested in it and now holds the title and possession of said triangular piece of ground, so derived by the said Richmond Mining Company from complainant, and is in the title and possession thereof, a successor of the said Richmond Mining Company, and also holds the title to said Richmond mining claim.

And your orator further shows to your honors that subsequently, to wit, in the year 1873, there was a controversy between complainant and defendant, the Richmond Mining Company of Nevada, so as aforesaid the successor and assign of the said Richmond Mining Company, wherein the complainant held and possessed the said Lookout mining claim, under the said patent thereof from the United States of America, it being the same Lookout mining claim mentioned in said deed last hereinbefore referred to, and lying and being northwest of and adjacent to the said At Last claim, and north of the said Richmond claim; and the said defendant, the Richmond Mining Company of Nevada, held and possessed the said Richmond

claim, and working upon a body of ore which said defendant contended had its cropping within the surface lines of the said Richmond claim, followed it down to its dip on the north, at an angle of 45 degrees, or thereabouts, outside of the surface lines of said Richmond claim, and under the surface of the said Lookout claim; and the complainant contended that said body of ore also had its cropping in the surface lines of the said Lookout claim, and was a part of said Lookout claim, and that said Lookout claim of complainant was a better and older title to said body of ore than the said Richmond claim of said defendant; and in said controversy litigation ensued between the complainant and said defendant, the Richmond Mining Company of Nevada; and thereafter, to compromise and settle the same, it was agreed by and between the complainant, by its agent, John Shaw, and the said Richmond Mining Company of Nevada, by its agent, J. J. Corrigan, in a written instrument, in words and figures following, to wit:

4 "J. Corrigan offers to pay $25,000, cash, 15th June.
" 25,000, " 15th July.
" 25,000, " 15th Aug.
" 10,000, " 15th Oct.,
} Company's Notes.

" without interest.

"The Eureka gives a deed to the Richmond for the Lookout "ground, with the United States patent for the same. The ore on "the Lookout dump goes to the Richmond. The Champion end "lines next to the Richmond to be continued across the hill. Pa- "pers to be drawn immediately, so to be approved before the first "payment becomes due. All suits against Richmond, Fisher and "King to be withdrawn. Deed and notes to be deposited with Bk. "of Cal. No damages to accrue to any of the two companies, in "consequence of any previous suits brought. San Francisco, June "10, 1873. The above are points of agreement made between J. "W. Shaw, on the part of Eureka, and J. J. Corrigan on the part "of the Richmond M. Co."

"JOHN W. SHAW."
"J. J. CORRIGAN."

That the complainant would convey to the said Richmond Mining Company of Nevada, the said Lookout claim, with the United States patent for the same, and the ore upon the dump thereof, and withdraw all suits in said litigation, and that the said Richmond Mining Company of Nevada would pay to the complainant eighty-five thousand dollars, and that the Champion end lines next to the Richmond, to wit, a line passing through a point on the lode whence the north corner of United States Survey Number 38, of said Eureka Mining District, bears north 38 deg. east, forty-seven (47) feet,

and extending from said point north 38 deg. east, across the hill, and indefinitely and continuously in the said course, should be the dividing and boundary line between the claims of the said companies, to wit, complainant and the said Richmond Mining Company of Nevada. And that no damages should accrue to any of the said two companies, in consequence of any previous suits brought in said litigation.

And your orator further shows to your honors that the complainant did afterwards, to wit, on the 16th day of June, A. D. 1873, convey to the said Richmond Mining Company of Nevada, the said Lookout claim, with the United States patent for the same, and the ore upon the dump thereof, and did withdraw all suits in said litigation, and the Richmond Mining Company of Nevada did pay to complainant the said sum of eighty-five thousand dollars, and the complainant did then and there do and perform fully and completely all and every of the terms of said agreement on its part agreed to be done and performed. And your orator further shows to your honors, that it was expressly agreed and understood by and between the parties to said agreement, and it was then and there the object, wish, and intention of said parties that said Champion end line, to wit, the said line passing through the point whence the north corner of United States Survey Number 38 of said Eureka Mining District bears north 38 deg. east, forty-seven (47) feet, and extending from said point north 38 deg. east, should continue across the hill indefinitely, and should be the continuous and permanent dividing and boundary line in that direction, between the mining claims and works of the said parties thereto.

And your orator further shows to your honors that thereafter, on the 16th day of June, A. D. 1873, complainant and the defendant, the Richmond Mining Company of Nevada, made and executed that certain instrument in writing, a copy of which is hereunto attached and made a part of this bill, marked "Exhibit K;" and the complainant made and executed and delivered to said defendant that certain deed, a copy of which is hereunto attached and made a part of this bill, marked "Exhibit L;" and the said defendant, the Richmond Mining Company of Nevada, made, executed, and delivered to complainant that certain deed, a copy of which is hereunto attached and made a part of this bill, marked "Exhibit M."

And your orator further shows to your honors, that a certain map hereunto attached and made a part of this bill, marked "Exhibit N," correctly represents the Champion, Nuget, At Last, Margaret and Lupita, Savage, Buckeye, Mammoth, Sentinel, Elliptic, and Tennyson claims of complainant and the Richmond and Lookout claims of the defendant, the Richmond Mining Company of Nevada, and ore croppings of the lode in the said Champion, Savage, Buckeye, At Last, Mammoth, and Sentinel and Richmond on the surface; and the said end line of the Champion commencing at a point whence the north corner of United States Survey Number

38 of said Eureka Mining District bears north 38 deg. east forty-seven (47) feet, marked "W," and extending north 38 deg. east, beyond the surface of the Champion, across the hill, to the point marked "C," in the ravine on the north side of said Ruby Hill; and the ravine marked with a line, and called on said map "Ravine;" and the Lawton shaft which is the working shaft of the complainant and the 9th level of complainant from said shaft at the depth of 730 feet below the surface marked "9th level of Eureka" and extending to and beyond a cross-drift near the end of said level and through a body of ore marked "Ore Body D," and the Richmond working shaft of defendant, the Richmond Mining Company of Nevada, which is marked "Richmond shaft," and the 5th level from said shaft which is marked "5th level," and the excavation from which ore has been taken called the "Potts' Chamber," entered through the said "5th level," which is 500 feet below the surface; and the sixth level from said shaft, which is marked "sixth level" and is 600 feet below surface; and the seventh level from said shaft which is marked "7th level" and is 700 feet below the surface; and the summit of the hill in the lines of the Lookout, At Last, Sentinel, and Mammoth, marked "Summit of Ridge."

And your orator further shows to your honors that on the south side of the lode bearing silver and other valuable minerals, croppings of which are found on the surface in the said Champion and other claims as aforesaid is an underlying mass of quartzite, being the south country rock and dipping to the north at an angle of from 35 deg. to 70 deg. and forming the foot wall of the said lode and that in said quartzite no ore bodies are found—and that said quartzite is found in its normal position in the workings of the complainant and in the 6th, 7th, and 8th levels from the said Richmond shaft, and is entered by the said Richmond shaft at the depth of 650 feet from the surface—and that over said quartzite are bodies of silver and other valuable mineral-bearing ore and bodies of limestone, and that over these bodies of ore and limestone is a wall of shale, forming the hanging wall of the lode, and that over this shale is the country limestone; that the dip of said shale hanging wall, to the depth found in present developments, is about 80 deg.; that on the tenth level of the complainant at the depth of 830 feet below the surface, the said foot wall and hanging wall are found 206 feet apart and facing each other; that on the said seventh level of the Richmond, the said foot wall and hanging wall are found about 230 feet apart; that no bodies of ore are found in the country limestone overlying the said hanging wall; that the said bodies of ore and limestone are found enclosed between said foot and hanging walls and that the said bodies of ore are sometimes found at and under the hanging wall and sometimes in the limestone in the lode, and most frequently lying on the quartzite foot wall; and that all of them have been or can be traced as your com-

plainant believes, and therefore avers, to the said foot wall; and that there is no intervening wall of a lode between said foot wall and hanging wall of said lode. And that on said lode adjoining the ground and claim of complainant thereon, on the east, are the claims and ground and works therein of the K. K. Mining Company and that therein at the depth of between 200 feet and 300 feet below the surface are found the said walls and a continuous body of ore extending from the said foot wall to the said hanging wall, a distance of about 300 feet.

And your orator further shows that the said Potts' chamber, and all the ore found in the workings from the said Richmond shaft are within and a part of said lode; and that that portion of said Potts' chamber and of the sixth and seventh levels from the said Richmond shaft, southeast of said line W. C., are a part of and within that portion of said lode owned and possessed by complainant, and granted to complainant in and by the said patents marked "Exhibit A," "Exhibit B," "Exhibit C," "Exhibit D," "Exhibit E," "Exhibit F," and "Exhibit G."

And your orator further shows to your honors, that since the month of August, 1876, the defendants, underground, have worked, dug out and excavated that portion of the said Potts' chamber and of the said sixth and seventh levels, southeast of said line W. C., and have taken therefrom thirty-five thousand tons of ore of the value of seventy dollars per ton, and have converted the same to their own use, and concealed from complainant the fact that they were working and digging in said Potts' chamber and in said sixth and seventh levels southeast of said line, until on or about the 10th day of February, A. D. 1877; and that, at said time, complainant first knew thereof, and thereafter, so soon as preparation could be made therefor, complainant commenced this suit. And that complainant has heretofore commenced, and has now pending in this court actions at law, to determine the title to said property and premises.

And your orator further shows to your honors that the said property and premises is a valuable silver mine and mining ground and claim, containing silver and other valuable mineral-bearing ore, earth, and rock of great value, to wit, to the value of five million dollars and upwards; and that the principal and almost entire value of said property and premises consists of the silver and other other valuable mineral-bearing ore, earth, and rock found therein.

And your orator further shows to your honors that heretofore, to wit, on or about the second day of September, A. D. 1876, the defendants, by themselves and their agents, employees, servants, and confederates, entered into a portion of the property and premises aforesaid of complainant, to wit, that portion thereof which has been exposed, opened, cut, and worked in the drifts and excavations, levels, and chambers, from the said Richmond working shaft, and from thence hitherto have and now do wrongfully and unlawfully

withhold from complainant the possesion of said portion of said property and premises, and are working and mining the same, and taking therefrom and converting to their own use, large quantities of the silver and other valuable mineral-bearing ore, earth, and rock found therein, to wit, at the rate of one hundred tons per day, of the value of seventy dollars and upwards per ton, thereby destroying said property and premises, and complainant's estate
6 therein; and do threaten to continue to do so, so long as any silver and other valuable mineral-bearing ore, earth, and rock, or other valuable mineral substance can be found therein, and to thereby entirely destroy said property and premises, and complainant's estate therein, and which your orator believes they will do, unless restrained by the order and injunction of this honorable court. All of which actings and doings of said defendants are contrary to equity and good conscience, and tend to the manifest wrong, injury, and oppression of your orator in the premises.

And your orator further shows to your honors, that the defendants are insolvent and unable to respond in damages for said acts and injuries.

In consideration whereof, and forasmuch as your orator is entirely remediless in the premises, at and according to the strict rules of the common law, and can have relief only in a court of equity, where matters of this nature are properly cognizable and relievable.

To the end, therefore, that the said defendants, The Richmond Mining Company of Nevada, Thomas Wren and Joseph Potts, and their confederates, if any, may be restrained from the doing of said acts threatened, and from the continuance of further trespass upon said property and premises, may, upon their several and respective oaths, full, true, direct, and perfect answer make to all and singular the matters and things hereinbefore stated and charged, as fully and particularly as if the same were hereinafter repeated, and they thereunto distinctly interrogated, and that not only as to the best of their respective knowledge and remembrance, but also to the best of their several and respective information, hearsay, and belief.

May it please your honor to grant to your orator not only the most gracious writ of injunction *pendente lite*, issuing out of and in accordance with the rules and practice of this honorable court, to be directed to the said defendants, the said The Richmond Mining Company of Nevada, Thomas Wren, and Joseph Potts, to restrain them, and each of them, and their, and each of their, agents, servants, employees, and confederates from entering into or upon the mine, mining ground, lode, property, and premises aforesaid or any part thereof, and working or mining thereon, or taking or removing therefrom any silver, or other valuable mineral-bearing ore, earth, or rock, or any mineral substance whatever, whether the same be in place or heretofore severed from the said freehold; as also a restraining order to the same effect, until an application for such injunction can be heard; and that at the final hearing such

injunction may be made perpetual; and that an account be taken of the waste already committed; and for such other and further relief as may be equitable.

And may it please your honors to grant to your orator the most gracious writ of subpœna of the United States of America, to be directed to the said defendants, The Richmond Mining Company of Nevada, Thomas Wren and Joseph Potts, and their confederates, when discovered, thereby commanding them and every one of them, at a certain day, and under a certain pain therein to be specified, personally to be and appear before your honors, in this honorable court, and then and there to answer all and singular the premises, and to stand to perform and abide such order and decree therein as to your honor shall seem meet, and your orator will ever pray.

GARBER & THORNTON,
Solicitors for Complainant.

S. HEYDENFELT,
H. K. MITCHELL,
Of Counsel.

UNITED STATES OF AMERICA,
NINTH CIRCUIT,
DISTRICT OF CALIFORNIA. } *ss.*

George S. Dodge, first being duly sworn, deposes and says that he is one of the trustees and president of the Eureka Consolidated Mining Company, complainant in the foregoing bill, having authority to verify said bill; that he has read said bill and knows the contents thereof, and that the same is true of his own knowledge, except as to the matters therein stated on information and belief, and as to those matters he believes it to be true.

Subscribed and sworn to before me, this 27 day of March, A. D. 1877.

GEO. S. DODGE.

L. S. B. SAWYER,
Comr. U. S. Circuit Court Dist. Cal.

7 "EXHIBIT A."

General Land Office No. 390. Mineral Certificate No. 80.

The United States of America. To all to whom these presents shall come, greeting:

Whereas, in pursuance of the act of Congress, approved July twenty-sixth, eighteen hundred and sixty-six, entitled "An act granting the right of way to ditch and canal owners over the public lands, and for other purposes," the act amendatory thereof, approved July ninth, eighteen hundred and seventy; and the act approved May tenth, eighteen hundred and seventy-two, entitled "An act to promote the development of the mining resources of the United States," there have been deposited in the General Land Office of

the United States the plat and field-notes of survey of the claim of the Eureka Consolidated Mining Company upon the Champion lode, bearing silver, accompanied by the certificate of the register of the land office at Austin, in the State of Nevada, whereby it appears that in pursuance of said acts of Congress, the Eureka Consolidated Mining Company did, on the first day of April, A. D. 1871, enter and pay for said mining claim or premises, being Mineral Entry No. Eight, in the series of said office, designated by the surveyor-general as lot number thirty-eight (38), forming a portion of the unsurveyed public domain in the Eureka Mining District in the County of Lander and State of Nevada, in the district of of lands subject to sale at Austin, embracing one (1) acre and six-tenths (6-10) of an acre of land, more or less, and according to the returns on file in the General Land Office, bounded, described, and platted as follows, with magnetic variation at sixteen (16) degrees thirty (30) minutes, east, to wit:

Beginning at a post marked "No. 1, U. S. Survey, No. 38," from which a prominent rocky point, No. 2, the summit of Silver Hill bears south seventy-one (71) degrees thirty-seven (37) minutes, east at the distance of seven thousand and fifty-one (7,051) feet. The flag-staff in the town of Eureka bears north sixty (60) degrees forty-six (46) minutes, east at the distance of ten thousand one hundred and seventy-nine (10,179) feet, and post No. 4 of survey No. 37, made for the claim of the Eureka Consolidated Mining Company upon the Buckeye lode, bears north thirty-eight (38) degrees east, at the distance of fifty (50) feet; thence from said post marked "No. 1, U. S. Survey, No. 38," south thirty-eight (38) degrees, west along the northwestern boundary of said survey No. 37, two hundred (200) feet to post marked "No. 2, U. S. Survey, No. 38," same being post No. 3 of said survey No. 37; thence north fifty-two (52) degrees west, three hundred and fifty (350) feet to post marked "No. 3, U. S. Survey, No. 38;" thence north thirty-eight (38) degrees east, two hundred (200) feet to post marked "No. 4, U. S. Survey, No. 38," from which the highest point of Ruby Hill, No. 1, bears north fifty-one (51) degrees thirty (30) minutes east, at the distance of eighty-eight (88) feet; thence south fifty-two (52) degrees east, three hundred and fifty (350) feet to the place of beginning, containing one (1) acre and six-tenths (6-10) of an acre of land, more or less, as represented by yellow shading in the following plat:

[Here follows map, marked page 8.]

9 Now know ye, that the United States of America, in consideration of the premises, and in conformity with said acts of Congress, *have given and granted*, and by these presents *do give and grant* unto the said Eureka Consolidated Mining Company, and to their successors and assigns, the said mining premises hereinbefore described as lot number thirty-eight (38), forming a portion of the unsurveyed public domain, with the exclusive right of pos-

session and enjoyment of all the land included within the exterior lines of said survey not herein expressly excepted from these presents, and of three hundred and fifty (350) linear feet of the said Champion vein, lode, ledge, or deposit as hereinbefore described throughout its entire depth, although it may enter the land adjoining, and of all veins, lodes, ledges, or deposits throughout their entire depth, the tops or apexes of which lie inside the exterior boundary lines of said survey at the surface extended downward vertically, although such veins, lodes, ledges, or deposits in their downward course may so far depart from a perpendicular as to extend outside the vertical side lines of said survey: *Provided*, that the right of possession hereby granted to such outside parts of said veins, lodes, ledges, or deposits shall be confined to such portions thereof as lie between vertical planes drawn downward through the end lines of said survey at the surface, so continued in their own direction that such vertical planes will intersect such exterior parts of said veins, lodes, ledges, or deposits: *And provided further*, that nothing in this conveyance shall authorize the grantees herein, their successors or assigns, to enter upon the *surface* of a mining claim owned or possessed by another: *To have and to hold* said mining premises, together with all the rights, privileges, immunities, and appurtenances of whatsoever nature thereunto belonging, unto the said Eureka Consolidated Mining Company, and to their successors and assigns forever, subject, nevertheless, to the following conditions and stipulations:

First. That the grant hereby made is restricted to the land hereinbefore described as lot number thirty-eight (38), with three hundred and fifty (350) linear feet of the Champion vein, lode, ledge, or deposit throughout its entire depth as aforesaid, together with all other veins, lodes, ledges, or deposits throughout their entire depth as aforesaid, the tops or apexes of which lie inside of the exterior lines of said survey, and to which no valid adverse claim existed on the tenth day of May, eighteen hundred and seventy-two.

Second. That the premises hereby conveyed, with the exception of the surface, may be entered by the proprietor of any other vein, lode, ledge, or deposit, the top or apex of which lies outside of the exterior limits of said survey, should the same in its downward course be found to penetrate, intersect, extend into, or underlie the premises hereby granted, for the purpose of extracting and removing the ore from such other vein, lode, ledge, or deposit.

Third. That the premises hereby conveyed shall be held subject to any vested and accrued water rights for mining, agricultural, manufacturing, or other purposes, and rights to ditches and reservoirs used in connection with such water rights as may be recognized and acknowledged by the local laws, customs, and decisions of courts.

Fourth. That in the absence of necessary legislation by Congress, the legislature of Nevada may provide rules for working the mining

claim or premises hereby granted, involving easements, drainage, and other necessary means to its complete development.

In testimony whereof, I, Ulysses S. Grant, President of the United States of America, have caused these letters to be made *patent*, and the *seal of the General Land Office* to be hereunto affixed.

Given under my hand at the city of Washington, the sixteenth day of July, in the year of our Lord one thousand eight hundred and seventy-two, and of the independence of the United States the ninety-seventh.

[SEAL U. S. LAND OFFICE.]

By the President:
U. S. GRANT.
By Z. B. STURGUS,
Asst. Secretary.
C. B. BRYNTON,
Recorder of the General Land Office.

Recorded Vol. 4, pages 270 to 276.

Recorded at request of Wells, Fargo & Co., Oct. 1st, A. D. 1872, at 30 min. past 5, P. M., in Liber 41 of Deeds, page 503.

H. J. BIDLEMAN, *Recorder.*

10 "EXHIBIT B."

General Land Office No. 2,068. Mineral Certificate No. 145.

The United States of America. To all to whom these presents shall come, greeting:

Whereas, in pursuance of the provisions of the revised statutes of the United States, chapter six, title thirty-two, there have been deposited in the General Land Office of the United States the plat and field-notes of survey of the claim of the Eureka Consolidated Mining Company upon the At Last lode, accompanied by the certificate of the register of the land office at Austin, in the State of Nevada, whereby it appears that in pursuance of the said revised statutes of the United States, the Eureka Consolidated Mining Company did, on the twenty-ninth day of March, A. D. 1873, enter and pay for said mining claim or premises, being Mineral Entry No. 145, in the series of said office, designated by the surveyor-general as lot number forty-seven, embracing a portion of the unsurveyed public domain in the Eureka Mining District, in the County of Eureka and State of Nevada, in the district of lands subject to sale at Eureka, formerly Austin, containing one (1) acre and seventy-seven hundredths (77-100) of an acre of land, more or less, and, according to the returns on file in the General Land Office, bounded, described, and platted as follows, with magnetic variation at sixteen (16) degrees thirty (30) minutes east, to wit:

Beginning at corner No. 1, a post marked "No. 1, U. S. Survey, No. 47," the same being corner No. 1 of survey No. 43, patented

to the Eureka Consolidated Mining Company, with their claim upon the Lookout lode, from which the flag-staff in the town of Eureka bears north sixty-three (63) degrees one (1) minute east at the distance of ten thousand one hundred and forty (10,140) feet; thence from said corner No. 1 south fifty-two (52) degrees east, four hundred and ten and two-tenths ($410\frac{2}{10}$) feet to corner No. 2, a post marked "No. 2, U. S. Survey, No. 47," on northwesterly boundary of survey No. 40, patented to the Eureka Consolidated Mining Company, with their claim upon the Sentinel lode; thence south forty-nine (49) degrees thirty (30) minutes west, along boundary of said survey No. 40, fifty-one (51) feet to corner No. 3, a post marked "No. 3, U. S. Survey, No. 47," the same being corner No. 3 of said survey No. 40, and corner No. 5 of survey No. 41, patented to the Eureka Consolidated Mining Company, with their claim upon the Mammoth lode; thence south thirty-eight (38) degrees west, one hundred (100) feet to corner No. 4, a post marked "No. 4, U. S. Survey, No. 47," the same being corner No. 4 of said survey No. 41, and on northeasterly boundary of survey No. 37, patented to the Eureka Consolidated Mining Company, with their claim upon the Buckeye lode, from which the Wind Sail shaft bears south fourteen (14) degrees fifteen (15) minutes west at the distance of one hunered and fourteen (114) feet; thence from said corner No. 4, north fifty-two (52) degrees west, along boundary of said survey No. 37, fifty (50) feet to corner No. 5, a post marked "No. 5, U. S. Survey, No. 47," the same being corner No. 4 of said survey No. 37; thence south thirty-eight (38) degrees west along northwesterly boundary of said survey No. 37, fifty (50) feet to corner No. 6, a post marked "No. 6, U. S. Survey, No. 47," the same being corner No. 1 of survey No. 38, patented to the Eureka Consolidated Mining Company, with their claim upon the Champion lode; thence north fifty-two (52) degrees west along the northeasterly boundary of said survey No. 38, three hundred and fifty (350) feet to corner No. 7, a post marked "No. 7, U. S. Survey, No. 47," the same being corner No. 4 of survey No. 38, and corner No. 2 of said survey No. 43, from which the highest point of Ruby Hill, No. 1, bears north fifty-one (51) degrees thirty (30) minutes east, at the distance of eighty-eight (88) feet; thence from said corner No. 7 north thirty-eight (38) degrees east, along the southeasterly boundary of said survey No. 43, two hundred (200) feet, to the place of beginning; containing one (1) acre and seventy-seven hundredths ($\frac{77}{100}$) of an acre of land, more or less, and embracing four hundred (400) linear feet of said At Last lode, as represented by yellow shading in the following plat:

[Here follows map, marked page 11.]

12 Now know ye, that the United States of America, in consideration of the premises, and in conformity with the said revised statutes of the United States, *have given and granted*, and by

these presents *do give and grant* unto the said Eureka Consolidated Mining Company, and to their successors and assigns, the said mining premises hereinbefore described as lot number forty-seven, embracing a portion of the unsurveyed public domain, with the exclusive right of possession and enjoyment of all the land included within the exterior lines of said survey not herein expressly excepted from these presents, and of four hundred (400) linear feet of the said At Last vein, lode, ledge, or deposit for the length hereinbefore described throughout its entire depth, although it may enter the land adjoining, and also of all other veins, lodes, ledges, or deposits throughout their entire depth, the tops or apexes of which lie inside the exterior lines of said survey at the surface extended downward vertically, although such veins, lodes, ledges, or deposits in their downward course may so far depart from a perpendicular as to extend outside the vertical side lines of said survey: *Provided*, that the right of possession hereby granted to such outside parts of said veins, lodes, ledges, or deposits shall be confined to such portions thereof as lie between vertical planes drawn downward through the end lines of said survey at the surface, so continued in their own direction that such vertical planes will intersect such exterior parts of said veins, lodes, ledges, or deposits: *And provided further*, that nothing in this conveyance shall authorize the grantees herein, their successors or assigns, to enter upon the *surface* of a mining claim owned or possessed by another: *To have and to hold* said mining premises, together with all the rights, privileges, immunities, and appurtenances of whatsoever nature thereunto belonging, unto the said Eureka Consolidated Mining Company, and to their successors and assigns forever, subject, nevertheless, to the following conditions and stipulations:

First. That the grant hereby made is restricted to the land hereinbefore described as lot number forty-seven, with four hundred (400) linear feet of the At Last vein, lode, ledge, or deposit for the length aforesaid throughout its entire depth as aforesaid, together with all other veins, lodes, ledges, or deposits throughout their entire depths as aforesaid, the tops or apexes of which lie inside the exterior lines of said survey.

Second. That the premises hereby conveyed, with the exception of the surface, may be entered by the proprietor of any other vein, lode, ledge, or deposit, the top or apex of which lies outside the exterior limits of said survey, should the same in its downward course be found to penetrate, intersect, extend into, or underlie the premises hereby granted, for the purpose of extracting and removing the ore from such other vein, lode, ledge, or deposit.

Third. That the premises hereby conveyed shall be held subject to any vested and accrued water rights for mining, agricultural, manufacturing, or other purposes, and rights to ditches and reservoirs used in connection with such water rights as may be recognized and acknowledged by the local laws, customs, and decisions of courts.

Fourth. That in the absence of necessary legislation by Congress, the legislature of Nevada may provide rules for working the mining claim or premises hereby granted, involving easements, drainage, and other necessary means to its complete development.

In testimony whereof, I, Ulysses S. Grant, President of the United States of America, have caused these letters to be made *patent*, and the *seal of the General Land Office* to be hereunto affixed.

Given under my hand at the city of Washington, the twelfth day of December, in the year of our Lord one thousand eight hundred and seventy-six, and of the independence of the United States the one hundred and first.

By the President: U. S. GRANT,

{ SEAL U. S. GENERAL LAND OFFICE. } By D. D. CONE, *Secretary.*

S. W. CLARK,
Recorder of the General Land Office.

Recorded Vol. 24, pages 288 to 293, inclusive.

13 "EXHIBIT C."

General Land Office No. 2,066. Mineral Certificate No. 144.

The United States of America. To all to whom these presents shall come, greeting:

Whereas, in pursuance of the provisions of the revised statutes of the United States, chapter six, title thirty-two, there have been deposited in the General Land Office of the United States the plat and field-notes of the survey of the claim of the Eureka Consolidated Mining Company upon the Nuget lode, accompanied by the certificate of the register of the land office at Austin, in the State of Nevada, whereby it appears that in pursuance of the said revised statutes of the United States, the Eureka Consolidated Mining Company did, on the twenty-ninth day of March, A. D. 1873, enter and pay for said mining claim or premises, being Mineral Entry No. 144, in the series of said office, designated by the surveyor-general as lot number forty-six, embracing a portion of the unsurveyed public domain in the Eureka Mining District, in the County of Eureka and State of Nevada, in the district of lands subject to sale at Eureka, formerly Austin, containing forty-four hundredths (44-100) of an acre of land, more or less, and, according to the returns on file in the General Land Office, bounded, described, and platted as follows, with magnetic variation at sixteen (16) degrees thirty (30) minutes east, to wit:

Beginning at corner No. 1, a post marked "No. 1, U. S. Survey, No. 46," the same being corner No. 3 of survey No. 37, patented to the Eureka Consolidated Mining Company, with their claim upon the Buckeye lode, corner No. 2 of survey No. 38, patented to the Eureka Consolidated Mining Company, with their claim upon the Champion lode, and corner No. 4 of survey No. 42, patented to the Eureka Consolidated Mining Company, with their

claim upon the Savage lode, from which Ruby Hill bears north eleven (11) degrees west at the distance of four hundred and thirty-six (436) feet; flag-staff in the town of Eureka bears north sixty (60) degrees eighteen (18) minutes east at the distance of ten thousand three hundred and seventy (10,370) feet; Keyes' shaft bears south seventy-seven (77) degrees thirty (30) minutes east at the distance of five hundred and sixteen (516) feet, and the Nuget shaft bears north sixty-five (65) degrees thirty (30) minutes west at the distance of sixty (60) feet; thence from said corner No. 1 south, thirty-eight (38) degrees west, along boundary of said survey No. 42, one hundred (100) feet to corner No. 2, a post marked "No. 2, U. S. Survey, No. 46," the same being corner No. 3 of said survey No. 42; thence north fifty-two (52) degrees west, one hundred and eighty-five and four-tenths ($185\frac{4}{10}$) feet to corner No. 3, an iron pin in road; thence north twenty-eight (28) degrees thirty (30) minutes east, one hundred and one and four-tenths ($101\frac{4}{10}$) feet to corner No. 4, a post marked "No. 4, U. S. Survey, No. 46;" thence south fifty-two (52) degrees east, along southwesterly boundary of said survey No. 38, two hundred and two and four-tenths ($202\frac{4}{10}$) feet, to the place of beginning, containing forty-four hundredths (44-100) of an acre of land, more or less, and embracing two hundred and two and two-tenths ($202\frac{2}{10}$) linear feet of said Nuget lode, to wit: one hundred and forty-four (144) linear feet northwesterly, and fifty-eight and two-tenths ($58\frac{2}{10}$) linear feet southeasterly from the Nuget shaft, as represented by yellow shading in the following plat:

[Here follows map, marked page 14.]

15 Now know ye, that the United States of America, in consideration of the premises, and in conformity with the said revised statutes of the United States, *have given and granted*, and by these presents *do give and grant* unto the said Eureka Consolidated Mining Company, and to their successors and assigns, the said mining premises hereinbefore described as lot number forty-six, forming a portion of the unsurveyed public domain, with the exclusive right of possession and enjoyment of all the land included within the exterior lines of said survey not herein expressly excepted from these presents, and of two hundred and two and two-tenths (202 2-10) linear feet of the said Nuget vein, lode, ledge, or deposit for the length hereinbefore described throughout its entire depth, although it may enter the land adjoining, and also of all other veins, lodes, ledges, or deposits throughout their entire depth, the tops or apexes of which lie inside the exterior lines of said survey at the surface extended downward vertically, although such veins, lodes, ledges, or deposits in their downward course may so far depart from a perpendicular as to extend outside the vertical side lines of said survey: *Provided*, that the right of possession hereby granted to such outside parts of said veins, lodes, ledges, or deposits shall be confined to such portions thereof as lie between vertical planes

drawn downward through the end lines of said survey at the surface, so continued in their own direction that such vertical planes will intersect such exteriorparts of said veins, lodes, ledges, or deposits: *And provided further*, that nothing in this conveyance shall authorize the grantees herein, their successors or assigns, to enter upon the *surface* of a mining claim owned or possessed by another: *To have and to hold* said mining premises, together with all the rights, privileges, immunities, and appurtenances of whatsoever nature thereunto belonging, unto the said Eureka Consolidated Mining Company, and to their successors and assigns forever, subject, nevertheless, to the following conditions and stipulations:

First. That the grant hereby made is restricted to the land hereinbefore described as lot number forty-six, with two hundred and two and two-tenths (202 2-10) linear feet of the Nuget vein, lode, ledge, or deposit for the length aforesaid throughout its entire depth as aforesaid, together with all other veins, lodes, ledges, or deposits throughout their entire depth as aforesaid, the tops or apexes of which lie inside the exterior lines of said survey.

Second. That the premises hereby conveyed, with the exception of the surface, may be entered by the proprietor of any other vein, lode, ledge, or deposit, the top or apex of which lies outside the exterior limits of said survey, should the same in its downward course be found to penetrate, intersect, extend into, or underlie the premises hereby granted, for the purpose of extracting and removing the ore from such other vein, lode, ledge, or deposit.

Third. That the premises hereby conveyed shall be held subject to any vested and accrued water rights for mining, agricultural, manufacturing, or other purposes, and rights to ditches and reservoirs used in connection with such water rights as may be recognized and acknowledged by the local laws, customs, and decisions of courts.

Fourth. That in the absence of necessary legislation by Congress, the legislature of Nevada may provide rules for working the mining claim or premises hereby granted, involving easements, drainage, and other necessary means to its complete development.

In testimony whereof, I, Ulysses S. Grant, President of the United States of America, have caused these letters to be made *patent*, and the *seal of the General Land Office* to be hereunto affixed.

Given under my hand at the city of Washington, the twelfth day of December, in the year of our Lord one thousand eight hundred and seventy-six, and of the independence of the United States the one hundred and first.

By the President:

[SEAL U. S. GENERAL LAND OFFICE.] U. S. GRANT,

By D. D. CONE, *Secretary.*

S. W. CLARK,

Recorder of the General Land Office.

Recorded Vol. 24, pages 276 to 281, inclusive.

16 "EXHIBIT D."

General Land Office No. 391. Mineral Certificate No. 109.

The United States of America. To all to whom these presents shall come, greeting:

Whereas, in pursuance of the act of Congress, approved July twenty-sixth, eighteen hundred and sixty-six, entitled "An act granting the right of way to ditch and canal owners over the public lands, and for other purposes," the act amendatory thereof, approved July ninth, eighteen hundred and seventy; and the act approved May tenth, eighteen hundred and seventy-two, entitled "An act to promote the development of the mining resources of the United States," there have been deposited in the General Land Office of the United States the plat and field-notes of survey of the claim of the Eureka Consolidated Mining Company upon the Savage lode bearing silver, accompanied by the certificate of the register of the land office at Austin, in the State of Nevada, whereby it appears that in pursuance of said acts of Congress the Eureka Consolidated Mining Company did, on the fourth day of September, A. D. 1871, enter and pay for said mining claim or premises, being Mineral Entry No. 109, in the series of said office, designated by the surveyor-general as lot number forty-two (42), forming a portion of the unsurveyed public domain in the Eureka Mining District, in the county of Lander and State of Nevada, in the district of lands subject to sale at Austin, embracing one (1) acre and four-tenths (4-10) of an acre of land, more or less, and, according to the returns on file in the General Land Office, bounded, described, and platted as follows, with magnetic variation at sixteen (16) degrees thirty (30) minutes east, to wit:

Beginning at a post marked "No. 1, U. S. Survey, No. 42," the same being post No. 2 of survey No. 37, made for the Eureka Consolidated Mining Company, upon the Buckeye lode, from which the highest point of Ruby Hill, No. 1, bears north thirty-four (34) degrees fifty-five (55) minutes west, at the distance of nine hundred and seventy-two (972) feet. A prominent rocky point, No. 2, the summit of Silver Hill bears south seventy-five (75) degrees one (1) minute east, at the distance of six thousand five hundred and sixty-five (6,565) feet, and the flag-staff in the town of Eureka bears north fifty-seven (57) degrees ten (10) minutes east, at the distance of ten thousand one hundred and sixty-two (10,162) feet; thence from said post marked "No. 1, U. S. Survey, No. 42," south thirty-eight (38) degrees west, one hundred (100) feet to post marked "No. 2, U. S. Survey, No. 42;" thence north fifty-two (52) degrees west, six hundred (600) feet to post marked "No. 3, U. S. Survey, No. 42;" thence north thirty-eight (38) degrees east, one hundred (100) feet to post marked "No. 4, U. S. Survey, No. 42," the same being post No. 3 of said survey No. 37, and post No. 2 of survey No. 38,

made for the Eureka Consolidated Mining Company's claim, upon the Champion lode; thence south fifty-two (52) degrees east, six hundred (600) feet to the place of beginning, containing one (1) acre and four-tenths (4–10) of an acre of land, more or less, as represented by yellow shading in the following plat:

[Here follows map, marked page 17.]

18 Now know ye, that the United States of America, in consideration of the premises, and in conformity with said acts of Congress, *have given and granted*, and by these presents *do give and grant* unto the said Eureka Consolidated Mining Company, and to their successors and assigns, the said mining premises hereinbefore described as lot number forty-two (42), forming a portion of the unsurveyed public domain, with the exclusive right of possession and enjoyment of all the land included within the exterior lines of said survey not herein expressly excepted from these presents, and of six hundred (600) linear feet of the said Savage vein, lode, ledge, or deposit as hereinbefore described throughout its entire depth, although it may enter the land adjoining, and of all veins, lodes, ledges, or deposits throughout their entire depth, the tops or apexes of which lie inside the exterior boundary lines of said survey at the surface extended downward vertically, although such veins, lodes, ledges, or deposits in their downward course may so far depart from a perpendicular as to extend outside the vertical side lines of said survey: *Provided*, that the right of possession hereby granted to such outside parts of said veins, lodes, ledges, or deposits shall be confined to such portions thereof as lie between vertical planes drawn downward through the end lines of said survey at the surface, so continued in their own direction that such vertical planes will intersect such exterior parts of said veins, lodes, ledges, or deposits: *And provided further*, that nothing in this conveyance shall authorize the grantees herein, their successors or assigns, to enter upon the *surface* of a mining claim owned or possessed by another: *To have and to hold* said mining premises, together with all the rights, privileges, immunities, and appurtenances of whatsoever nature thereunto belonging, unto the said Eureka Consolidated Mining Company, and to their successors and assigns forever, subject, nevertheless, to the following conditions and stipulations:

First. That the grant hereby made is restricted to the land hereinbefore described as lot number forty-two (42), with six hundred (600) linear feet of the Savage vein, lode, ledge, or deposit throughout its entire depth as aforesaid, together with all other veins, lodes, ledges, or deposits throughout their entire depth as aforesaid, the tops or apexes of which lie inside of the exterior lines of said survey, and to which no valid adverse claim existed on the tenth day of May, eighteen hundred and seventy-two.

Second. That the premises hereby conveyed, with the exception of the surface, may be entered by the proprietor of any other vein,

lode, ledge, or deposit, the top or apex of which lies outside of the exterior limits of said survey, should the same in its downward course be found to penetrate, intersect, extend into, or underlie the premises hereby granted, for the purpose of extracting and removing the ore from such other vein, lode, ledge, or deposit.

Third. That the premises hereby conveyed shall be held subject to any vested and accrued water rights for mining, agricultural, manufacturing, or other purposes, and rights to ditches and reservoirs used in connection with such water rights as may be recognized and acknowledged by the local laws, customs, and decisions of courts.

Fourth. That in the absence of necessary legislation by Congress, the legislature of Nevada may provide rules for working the mining claim or premises hereby granted, involving easements, drainage, and other necessary means to its complete development.

In testimony whereof, I, Ulysses S. Grant, President of the United States of America, have caused these letters to be made *patent*, and the *seal of the General Land Office* to be hereunto affixed.

Given under my hand at the city of Washington, the sixteenth day of July, in the year of our Lord one thousand eight hundred and seventy-two, and of the independence of the United States the ninety-seventh.

By the President:

[SEAL U. S. GENERAL LAND OFFICE.] U. S. GRANT,

By Z. B. STURGUS,
Asst. Secretary.

C. B. BRYNTON,
Recorder of the General Land Office.

Recorded Vol. 4, pages 277 to 283.

Recorded at request of Wells, Fargo & Co., Oct. 1st, A. D. 1872, at 30 min. past 5, P. M., in liber 41 of deeds, page 506.

H. J. BIDLEMAN, *Recorder.*

19 "EXHIBIT E."

General Land Office No. 389. Mineral Certificate No. 70.

The United States of America. To all to whom these presents shall come, greeting:

Whereas, in pursuance of the act of Congress, approved July twenty-sixth, eighteen hundred and sixty-six, entitled "An act granting the right of way to ditch and canal owners over the public lands, and for other purposes," the act amendatory thereof, approved July ninth, eighteen hundred and seventy; and the act approved May tenth, eighteen hundred and seventy-two, entitled "An act to promote the development of the mining resources of the United States," there have been deposited in the General Land Office of the United States the plat and field-notes of survey of the claim of the Eureka Consolidated Mining Company upon the

Buckeye lode, bearing silver, accompanied by the certificate of the register of the land office at Austin, in the State of Nevada, whereby it appears that in pursuance of said acts of Congress, the Eureka Consolidated Mining Company did, on the first day of April, A. D. 1871, enter and pay for said mining claim or premises, being Mineral Entry No. Seventy-nine, in the series of said office, designated by the surveyor-general as lot number thirty-seven (37), forming a portion of the unsurveyed public domain in the Eureka Mining District, in the county of Lander and State of Nevada, in the district of lands subject to sale at Austin, embracing three (3) acres and five-tenths (5-10) of an acre of land, more or less, and, according to the returns on file in the General Land Office, bounded, described, and platted as follows, with magnetic variation at sixteen (16) degrees thirty (30) minutes east, to wit:

Beginning at a post marked "No. 1, U. S. Survey, No. 37," from which the highest point of Ruby Hill, No. 1, bears north forty-nine (49) degrees forty-eight (48) minutes west, at the distance of nine hundred and thirty (930) feet. A prominent rocky point, No. 2, the summit of Silver Hill bears south seventy-three (73) degrees east, at the distance of six thousand four hundred and seventy-one (6,471) feet. The flag-staff in the town of Eureka bears north fifty-seven (57) degrees forty (40) minutes east, at the distance of nine thousand nine hundred and eighteen (9,918) feet, and the center of the shaft on the Tennyson lode bears south thirty-five (35) degrees west, at the distance of one hundred and fifty-six (156) feet; thence from said post marked "No. 1, U. S. Survey, No. 37," south thirty-eight (38) degrees west, two hundred and fifty (250) feet to post marked "No. 2, U. S. Survey, No. 37;" thence north fifty-two (52) degrees west, six hundred (600) feet to post marked "No. 3, U. S. Survey, No. 37;" thence north thirty-eight (38) degrees east, two hundred and fifty (250) feet to post marked "No. 4, U. S. Survey, No. 37;" thence south fifty-two (52) degrees east, six hundred (600) feet to the place of beginning; containing three (3) and five-tenths (5-10) of an acre of land, more or less, as represented by yellow shading in the following plat:

[Here follows map, marked page 20.]

21 Now know ye, that the United States of America, in consideration of the premises, and in conformity with said acts of Congress, *have given and granted*, and by these presents *do give and grant* unto the said Eureka Consolidated Mining Company, and to their successors and assigns, the said mining premises hereinbefore described as lot number thirty-seven (37), forming a portion of the unsurveyed public domain, with the exclusive right of possession and enjoyment of all the land included within the exterior lines of said survey not herein expressly excepted from these presents, and of six hundred (600) linear feet of the said Buckeye vein, lode, ledge, or deposit as hereinbefore described throughout

its entire depth, although it may enter the land adjoining, and of all veins, lodes, ledges, or deposits throughout their entire depth, the tops or apexes of which lie inside the exterior boundary lines of said survey at the surface extended downward vertically, although such veins, lodes, ledges, or deposits in their downward course may so far depart from a perpendicular as to extend outside the vertical side lines of said survey: *Provided*, that the right of possession hereby granted to such outside parts of said veins, lodes, ledges, or deposits shall be confined to such portions thereof as lie between vertical planes drawn downward through the end lines of said survey at the surface, so continued in their own direction that such vertical planes will intersect such exterior parts of said veins, lodes, ledges, or desposits: *And provided further*, that nothing in this conveyance shall authorize the grantees herein, their successors or assigns, to enter upon the *surface* of a mining claim owned or possessed by another: *To have and to hold* said mining premises, together with all the rights, privileges, immunities, and appurtenances of whatsoever nature thereunto belonging, unto the said Eureka Consolidated Mining Company, and to their successors and assigns forever, subject, nevertheless, to the following conditions and stipulations:

First. That the grant hereby made is restricted to the land hereinbefore described as lot number thirty-seven (37), with six hundred (600) linear feet of the Buckeye vein, lode, ledge, or deposit throughout its entire depth as aforesaid, together with all other veins, lodes, ledges or deposits throughout their entire depth as aforesaid, the tops or apexes of which lie inside of the exterior lines of said survey, and to which no valid adverse claim existed on the tenth day of May, eighteen hundred and seventy-two.

Second. That the premises hereby conveyed, with the exception of the surface, may be entered by the proprietor of any other vein, lode, ledge, or deposit, the top or apex of which lies outside of the exterior limits of said survey, should the same in its downward course be found to penetrate, intersect, extend into, or underlie the premises hereby granted, for the purpose of extracting and removing the ore from such other vein, lodge, ledge, or deposit.

Third. That the premises hereby conveyed shall be held subject to any vested and accrued water rights for mining, agricultural, manufacturing, or other purposes, and rights to ditches and reservoirs used in connection with such water rights as may be recognized and acknowledged by the local laws, customs, and decisions of courts.

Fourth. That in the absence of necessary legislation by Congress, the legislature of Nevada may provide rules for working the mining claim or premises hereby granted, involving easements, drainage, and other necessary means to its complete development.

In testimony whereof, I, Ulysses S. Grant, President of the United States of America, have caused these letters to be made *patent*, and the *seal of the General Land Office* to be hereunto affixed.

Given under my hand at the city of Washington, the sixteenth day of July, in the year of our Lord one thousand eight hundred and seventy-two, and of the independence of the United States the ninety-seventh.

By the President:

[SEAL U. S. GENERAL LAND OFFICE.] U. S. GRANT,
By Z. B. STURGUS,
Asst. Secretary.
C. B. BRYNTON,
Recorder of the General Land Office.

Recorded Vol. 4, pages 263 to 269.

Recorded at request of Wells, Fargo & Co., Oct. 1st, A. D. 1872, at 30 min. past 5 P. M., in Liber 41 of Deeds, page 509.

H. J. BIDLEMAN, *Recorder.*

22 "EXHIBIT F."

General Land Office No. 383. Mineral Certificate No. 108.

The United States of America. To all to whom these present shall come, greeting:

Whereas, in pursuance of the act of Congress, approved July twenty-sixth, eighteen hundred and sixty-six, entitled "An act granting the right of way to ditch and canal owners over the public lands, and for other purposes," the act amendatory thereof, approved July ninth, eighteen hundred and seventy; and the act approved May tenth, eighteen hundred and seventy-two, entitled "An act to promote the development of the mining resources of the United States," there have been deposited in the General Land Office of the United States the plat and field-notes of survey of the claim of the Eureka Consolidated Mining Company upon the Mammoth lode bearing silver, accompanied by the certificate of the register of the land office at Austin, in the State of Nevada, whereby it appears that in pursuance of said acts of Congress, the Eureka Consolidated Mining Company did, on the fourth day of September, A. D. 1871, enter and pay for said mining claim or premises, being Mineral Entry No. 108, in the series of said office, designated by the surveyor-general as lot number forty-one (41), forming a portion of the unsurveyed public domain in the Eureka Mining District, in the county of Lander and State of Nevada, in the district of lands subject to sale at Austin, embracing one (1) acre and six-tenths (6-10) of an acre of land, more or less, and, according to the returns on file in the General Land Office, bounded, described, and platted as follows, with magnetic variation at sixteen (16) degrees thirty (30) minutes east, to wit:

Beginning at post marked "No. 1, U. S. Survey, No. 41," the same being post No. 2 of survey No. 40, made for the Eureka Consolidated Mining Company upon the Sentinel lode, from which a prominent rocky point, No. 2, the summit of Silver Hill bears south

seventy-two (72) degrees forty-two (42) minutes east, at the distance of six thousand two hundred and seventy-one (6,271) feet. The highest point of Ruby Hill, No. 1, bears north fifty-five (55) degrees twenty (20) minutes west, at the distance of eleven hundred and nine (1109) feet. The flag-staff in the town of Eureka bears north fifty-six (56) degrees fifty-three (53) minutes east, at the distance of nine thousand seven hundred and sixty-five (9,765) feet; thence from said post No. 1 south thirty-eight (38) degrees west, fifty-four (54) feet to post "No. 2, U. S. Survey, No. 41;" thence north seventy-six (76) degrees forty-five (45) minutes west, one hundred and ten (110) feet to post marked "No. 3, U. S. Survey, No. 41;" thence north fifty-two (52) degrees west, seventy-seven and one-half (77½) feet to post No. 1 of survey No. 37, made for the claim of the Eureka Consolidated Mining Company, on the Buckeye lode, six hundred and twenty-seven and one-half (627½) feet to post marked "No. 4, U. S. Survey, No. 41," on northeastern boundary of said survey No. 37; thence north thirty-eight (38) degrees east, one hundred (100) feet to post marked "No. 5, U. S. Survey, No. 41," the same being post No. 3 of said survey No. 40; thence south fifty-two (52) degrees east, seven hundred and twenty-seven (727) feet and one-half (½) of a foot to the place of beginning; containing one (1) acre and six-tenths (6-10) of an acre of land, more or less, as represented in the following plat:

[Here follows map, marked page 23.]

24 Now know ye, that the United States of America, in consideration of the premises, and in conformity with said acts of Congress, *have given and granted*, and by these presents *do give and grant* unto the said Eureka Consolidated Mining Company, and to their successors and assigns, the said mining premises hereinbefore described as lot number forty-one (41), forming a portion of the unsurveyed public domain, with the exclusive right of possession and enjoyment of all the land included within the exterior lines of said survey not herein expressly excepted from these presents, and of seven hundred and twenty-seven and one-half linear feet of the said Mammoth vein, lode, ledge, or deposit as hereinbefore described throughout its entire depth, although it may enter the land adjoining, and of all veins, lodes, ledges, or deposits throughout their entire depth, the tops or apexes of which lie inside the exterior boundary lines of said survey at the surface extended downward vertically, although such veins, lodes, ledges, or deposits in their downward course may so far depart from a perpendicular as to extend outside the vertical side lines of said survey: *Provided*, that the right of possession hereby granted to such outside parts of said veins, lodes, ledges, or deposits shall be confined to such portions thereof as lie between vertical planes drawn downward through the end lines of said survey at the surface, so continued in their own direction that such vertical planes will intersect such exterior parts of said veins, lodes, ledges, or deposits: *And provided further*, that

nothing in this conveyance shall authorize the grantees herein, their successors or assigns, to enter upon the *surface* of a mining claim owned or possessed by another: *To have and to hold* said mining premises, together with all the rights, privileges, immunities, and appurtenances of whatsoever nature thereunto belonging, unto the said Eureka Consolidated Mining Company, and to their successors and assigns forever, subject, nevertheless, to the following conditions and stipulations:

First. That the grant hereby made is restricted to the land hereinbefore described as lot number forty-one (41), with seven hundred and twenty-seven and one-half linear feet of the Mammoth vein, lode, ledge, or deposit throughout its entire depth as aforesaid, together with all other veins, lodes, ledges, or deposits throughout their entire depth as aforesaid, the tops or apexes of which lie inside of the exterior lines of said survey, and to which no valid adverse claim existed on the tenth day of May, eighteen hundred and seventy-two.

Second. That the premises hereby conveyed, with the exception of the surface, may be entered by the proprietor of any other vein, lode, ledge, or deposit, the top or apex of which lies outside of the exterior limits of said survey, should the same in its downward course be found to penetrate, intersect, extend into, or underlie the premises hereby granted, for the purpose of extracting and removing the ore from such other vein, lode, ledge, or deposit.

Third. That the premises hereby conveyed shall be held subject to any vested and accrued water rights for mining, agricultural, manufacturing, or other purposes, and rights to ditches and reservoirs used in connection with such water rights as may be recognized and acknowledged by the local laws, customs, and decisions of courts.

Fourth. That in the absence of necessary legislation by Congress, the legislature of Nevada may provide rules for working the mining claim or premises hereby granted, involving easements, drainage, and other necessary means to its complete development.

In testimony whereof, I, Ulysses S. Grant, President of the United States of America, have caused these letters to be made *patent*, and the *seal of the General Land Office* to be hereunto affixed.

Given under my hand at the City of Washington, the third day of July, in the year of our Lord one thousand eight hundred and seventy-two, and of the independence of the United States the ninety-sixth.

By the President:

[SEAL U. S. GENERAL LAND OFFICE.]

U. S. GRANT,
By J. PARRISH, *Secretary.*
C. B. BRYNTON,
Recorder of the General Land Office.

Recorded Vol. 4, pages 228 to 233.

Recorded at request of Wells, Fargo & Co., Oct. 1st, A. D. 1872, at 30 min. past 5 P. M., in Liber 41 of Deeds, page 500.

H. J. BIDLEMAN, *Recorder.*

25 "EXHIBIT G."

General Land Office No. 382. Mineral Certificate No. 101.

The United States of America. To all to whom these presents shall come, greeting:

Whereas, in pursuance of the act of Congress, approved July twenty-sixth, eighteen hundred and sixty-six, entitled "An act granting the right of way to ditch and canal owners over the public lands, and for other purposes," the act amendatory thereof, approved July ninth, eighteen hundred and seventy; and the act approved May tenth, eighteen hundred and seventy-two, entitled "An act to promote the development of the mining resources of the United States," there have been deposited in the General Land Office of the United States the plat and field-notes of survey of the claim of the Eureka Consolidated Mining Company upon the Sentinel lode, bearing silver, accompanied by the certificate of the register of the land office at Austin, in the State of Nevada, whereby it appears that in pursuance of said acts of Congress, the Eureka Consolidated Mining Company did, on the fifth day of July, A. D. 1871, enter and pay for said mining claim or premises, being Mineral Entry No. 101, in the series of said office, designated by the surveyor-general as lot number forty (40), forming a portion of the unsurveyed public domain in the Eureka Mining District, in the county of Lander and State of Nevada, in the district of lands subject to sale at Austin, embracing three (3) acres and twenty-five hundredths (25-100) of an acre of land, more or less, and, according to the returns on file in the General Land Office, bounded, described, and platted as follows, with magnetic variation at sixteen (16) degrees thirty (30) minutes east, to wit:

Beginning at a post marked "No. 1, U. S. Survey, No. 40," from which a prominent rocky point, No. 2, the summit of Silver Hill bears south seventy-one (71) degrees east, at the distance of six thousand two hundred and two (6,202) feet, and the flag-staff in the town of Eureka bears north fifty-seven (57) deg. seventeen (17) minutes east, at the distance of nine thousand five hundred and seventy-five (9,575) feet; thence south thirty-eight (38) deg. west, two hundred (200) feet to post marked "No. 2, U. S. Survey, No. 40," from which post No. 1 of survey No. 37, made for the claim of the Eureka Consolidated Mining Company upon the Buckeye lode, bears north eighty-one (81) deg. thirty (30) minutes west, at the distance of two hundred and three (203) feet and one-half ($\frac{1}{2}$) of a foot; thence from said post marked "No. 2, U. S. Survey, No. 40," north fifty-two deg. west, seven hundred and twenty-seven (727) feet and one-half ($\frac{1}{2}$) of a foot to post marked "No. 3, U. S. Survey, No. 40," from which the highest point of Ruby Hill, No. 1, bears north sixty-one (61) deg. thirty-nine (39) minutes west, at the distance of three hundred and eighty-five (385) feet; thence north forty-nine

(49) degrees thirty (30) minutes east, two hundred and four (204) feet to post marked "No. 4, U. S. Survey, No. 40;" thence south fifty-two (52) degrees east, six hundred and eighty-seven (687) feet and one-half (½) of a foot, to the place of beginning, containing three (3) acres and twenty-five hundredths (25-100) of an acre of land, more or less, as represented by the following plat:

[Here follows map, marked page 26.]

27 Now know ye, that the United States of America, in consideration of the premises, and in conformity with said acts of Congress, *have given and granted*, and by these presents *do give and grant* unto the said Eureka Consolidated Mining Company, and to their successors and assigns, the said mining premises hereinbefore described as lot number forty (40), forming a portion of the unsurveyed public domain, with the exclusive right of possession and enjoyment of all the land included within the exterior lines of said survey not herein expressly excepted from these presents, and of seven hundred and seven and one-half linear feet of the said Sentinel vein, lode, ledge, or deposit as hereinbefore described throughout its entire depth, although it may enter the land adjoining, and of all veins, lodes, ledges, or deposits throughout their entire depth, the tops or apexes of which lie inside the exterior boundary lines of said survey at the surface extended downward vertically, although such veins, lodes, ledges, or deposits in their downward course may so far depart from a perpendicular as to extend outside the vertical side lines of said survey: *Provided*, that the right of possession hereby granted to such outside parts of said veins, lodes, ledges, or deposits shall be confined to such portions thereof as lie between vertical planes drawn downward through the end lines of said survey at the surface, so continued in their own direction that such vertical planes will intersect such exterior parts of said veins, lodes, ledges, or deposits: *And provided further*, that nothing in this conveyance shall authorize the grantees herein, their successors or assigns, to enter upon the *surface* of a mining claim owned or possessed by another: *To have and to hold* said mining premises, together with all the rights, privileges, immunities, and appurtenances of whatsoever nature thereunto belonging, unto the said Eureka Consolidated Mining Company, and to their successors and assigns forever, subject, nevertheless, to the following conditions and stipulations:

First. That the grant hereby made is restricted to the land hereinbefore described as lot number forty (40), with seven hundred and seven and one-half linear feet of the Sentinel vein, lode, ledge, or deposit throughout its entire depth as aforesaid, together with all other veins, lodes, ledges, or deposits throughout their entire depth as aforesaid, the tops or apexes of which lie inside of the exterior lines of said survey, and to which no valid adverse claim existed on the tenth day of May, eighteen hundred and seventy-two.

Second. That the premises hereby conveyed, with the exception of the surface, may be entered by the proprietor of any other vein, lode, ledge, or deposit, the top or apex of which lies outside of the exterior limits of said survey, should the same in its downward course be found to penetrate, intersect, extend into, or underlie the premises hereby granted, for the purpose of extracting and removing the ore from such other vein, lode, ledge, or deposit.

Third. That the premises hereby conveyed shall be held subject to any vested and accrued water rights for mining, agricultural, manufacturing, or other purposes, and rights to ditches and reservoirs used in connection with such water rights as may be recognized and acknowledged by the local laws, customs, and decisions of courts.

Fourth. That in the absence of necessary legislation by Congress, the legislature of Nevada may provide rules for working the mining claim or premises hereby granted, involving easements, drainage, or other necessary means to its complete development.

In testimony whereof, I, Ulysses S. Grant, President of the United States of America, have caused these letters to be made *patent*, and the *seal of the General Land Office* to be hereunto affixed.

Given under my hand at the city of Washington, the third day of July, in the year of our Lord one thousand eight hundred and seventy-two, and of the independence of the United States the ninety-sixth.

By the President:

[SEAL U. S. GENERAL LAND OFFICE.] U. S. GRANT,

By J. PARRISH, *Secretary.*

C. B. BRYNTON,

Recorder of the General Land Office.

Recorded Vol. 4, pages 222 to 227.

Recorded at request of Wells, Fargo & Co., Oct. 1st, A. D. 1872, at 30 min. past 5 P. M., in Liber 41 of Deeds, page 512.

H. J. BIDLEMAN, *Recorder.*

28 "EXHIBIT I."

EUREKA CONS'D MINING CO.
TO
RICHMOND MINING COMPANY.

This indenture, made the twenty-sixth day of April, in the year of our Lord one thousand eight hundred and seventy-one, between the Eureka Consolidated Mining Company, party of the first part, and the Richmond Mining Company, the party of the second part, witnesseth, that the said party of the first part for and in consideration of the sum of one dollar, gold coin of the United States of America, to it in hand paid by the said party of the second part, the receipt whereof is hereby acknowledged, has remised, released,

and forever quit-claimed, and by these presents does remise, release, and forever quit-claim unto the said party of the second part and to its heirs and assigns, all that certain lot, piece, or parcel of land situate, lying, and being in the State of Nevada, County of Lander, Eureka Mining District, and bounded and particularly described as follows, to wit:

Commencing at a point whence the S. W. corner of the Champion mine bears S. 52 degrees E. 202.2 ft. (two hundred and two and two 2-10 feet), and thence running N. 52 deg. W. 147.8 ft. (one forty-seven and 8-10 feet); thence N. 38 deg. E., 153 ft. (one hundred and fifty-three feet); thence S. 6 deg. E. 212.8 ft. (two hundred and twelve and 8-10 feet) to the place of beginning, containing 26-100 (twenty-sixth one hundredths) acres.

The above described triangle is ground claimed by the Richmond Mining Company as a part of their original location, and was included within the survey made for the Eureka Consolidated Mining Company. But it is expressly understood and agreed that this deed does not convey or quit-claim or release any ores, precious metals, veins, lodes, or deposits, dips, spurs, or angles not embraced within the above mentioned boundaries, and that the party of the second part agrees and covenants for itself, its successors and assigns, to make no claim hereafter to any ground or ore or metals therein embraced within the Nuget, Champion, Lookout, At Last, Margaret, and other mining claims and locations now owned and possessed by the party of the first part, except as to that contained within the limits of the above described triangular piece of ground; together with all and singular the tenements, hereditaments and appurtenances thereunto belonging or in any wise appertaining, and the reversion and reversions, remainder and remainders, rents, issues, and profits thereof. And also all the estate, right, title, interest, property, possession, claim, and demand whatsoever, as well in law as in equity of the said party of the first part, of, in, or to the said premises, and every part and parcel thereof, with the appurtenances.

To have and to hold all and singular the said premises, together with the appurtenances, unto the said party of the second part, its successors and assigns, forever.

In witness whereof, the said party of the first part has hereunto set its hand and seal the day and year first above written.

EUREKA CONSOLIDATED MINING CO.,
By its president, G. T. LAWTON. [SEAL.]

Signed, sealed, and delivered in presence of E. V. JOICE.

[U. S. and state rev. stps., 50c. ea., cld.]

STATE OF CALIFORNIA,
CITY AND COUNTY OF SAN FRANCISCO. } ss.

On this twenty-sixth day of April, 1871, before me, E. V. Joice, a commissioner of deeds for the State of Nevada, duly commissioned

and sworn, residing in the city and county aforesaid, personally appeared the within named G. T. Lawton, President of the Eureka Consolidated Mining Company, a corporation organized under and by virtue of the laws of the State of California, whose name is subscribed to the annexed instrument as such president, personally known to me to be the individual described in and who executed said instrument as such president of said corporation, and who acknowledged to me that he executed the same freely and voluntarily, and for the uses and purposes therein mentioned, and as the act and deed of said corporation, and that the seal affixed to said instrument is its true and lawful corporate seal, and that he subscribed the said instrument, and said corporate seal was affixed by virtue of authority duly conferred by said corporation.

Witness my hand and official seal, the day and year in this certificate first written.

[SEAL.] E. V. JOICE,
Commissioner of Deeds for the State of Nevada.

Recorded at request of Wm. Adams, May 4, A. D. 1871, at 8 min. past 6, P. M.

H. J. BIDDLEMAN, *Recorder.*

Liber 39, page 257, Lander County Records, Book 2, page 615 of transcribed records of Lander to Eureka County.

29 "EXHIBIT K."

EUREKA CONSOLIDATED MINING COMPANY
AND
RICHMOND MINING COMPANY OF NEVADA.

This agreement, made the sixteenth day of June, A. D. one thousand eight hundred and seventy-three, between the Eureka Consolidated Mining Company, a corporation organized under the laws of the State of California, of the first part, and the Richmond Mining Company, of Nevada, a corporation organized under the laws of the State of Nevada, of the second part.

Whereas, differences have arisen and now exist between the parties hereto, in respect to the ownership and right of possession of certain mining ground, known as the Lookout ground or claim, situate in the Eureka Mining District in the County of Eureka, State of Nevada, and of the ores, metals, and deposits found in and under the said ground; and whereas, an action is, or certain actions are now pending in the courts of the State of Nevada, where the party hereto of the first part is the plaintiff; and the party hereto of the second part and others, are the defendants; for the recovery, among other things, of the possession of the ground and of the ores therein contained, or which have been taken therefrom by the defendants, in which action a bond has, or bonds have been entered into or given

by and on behalf of the plaintiff, upon an application by the said plaintiff for an injunction, or restraining order against the said defendants or some of them, and also, upon a claim and delivery of personal property by said plaintiff; and whereas, the said parties have agreed to settle all the differences between them and put an end to the litigation now pending as aforesaid.

Now, therefore, this agreement witnesseth, that the said party of the first part, for and in consideration of the sum of eighty-five thousand dollars, gold coin of the United States, to be paid by said party of the second part, at the times and in the manner hereinafter set forth, and the further covenants, agreements, and conditions hereinafter contained, to be kept, performed, and observed by, and on the part of the said party of the second part, have agreed, and do hereby agree, to convey to the said party of the second part, its successors and assigns, with warranty against their own acts, all that certain lot, piece, or parcel of land, or mining ground, situate in the Eureka Mining District, County of Eureka, State of Nevada, and known as the Lookout ground or claim; and also, all the mining ground and claim lying on the northwesterly side of a certain line, commencing at the northeasterly corner of the Margaret mining ground or claim, which corner is marked × on the map or plan hereto annexed, and made part of this agreement; running thence in a southwesterly direction along the edge of said Margaret ground, the At Last ground, and the Champion ground, to a point marked W on said map; thence southerly along the edge of said Champion ground, to the northeasterly corner of the Nugget ground; thence in a southwesterly direction along the edge of said Nugget ground, to the northwesterly corner thereof, at the point marked R on said map or plan, together with all the ores, precious metals, including those now lying on the dump at the "Lookout Shaft," and all veins, lodes, ledges, deposits, dips spurs, or angles on, in, or under the same contained; and to dismiss all the said actions now pending in the courts of the State of Nevada, between the parties hereto, in respect to the said land or mining claim, and the ores, precious metals, veins, lodes, ledges, deposits, dips, spurs, and angles, on, in, or under the same, or which may have been taken from the said land or mining ground, and to release the said party of the second part, and all persons acting for or in its behalf, from all claims and demands in respect to the said land or mining ground, and to the ores, precious metals, veins, lodes, ledges, deposits, dips, spurs, or angles, now or heretofore found in or under the same. And the said party of the first part further agrees not to protest against or put any obstacle in the way of the party of the second part in their application for a United States patent to the Richmond or other lodes or veins, provided each application do not conflict or cross the aforesaid line agreed upon; and the said party of the second part, in consideration of the premises, hath agreed and doth hereby agree to pay to the said party of the first part, its successors or assigns, the

said sum of eighty-five thousand dollars, in gold coin of the United States, in manner following, that is to say:

On the execution hereof, the sum of twenty-five thousand dollars; on the sixteenth day of July, one thousand eight hundred and seventy-three, the sum of twenty-five thousand dollars; on the sixteenth day of August next following, the sum of twenty-five thousand dollars; and on the sixteenth day of September next following, the sum of ten thousand dollars, for all of which payments, except the first, the said party of the second part is to give its promissory notes.

And the said party of the second part, for the consideration aforesaid, hath further agreed, and doth hereby further agree, to release and discharge, and doth hereby release and discharge the said party of the first part, its successors and assigns and its sureties, from all claims and demands, whether for damages, compensation, or indemnity, or otherwise, or under or by reason of any bond or undertaking, made, given, or entered into by or on behalf of the said party of the first part, in any action or suit now or heretofore pending or subsisting in respect to the said land or mining ground, or the ores, precious metals, veins, lodes, ledges, deposits, dips, spurs, or angles, now or heretofore found in or under the same, and from any act, thing, or proceeding done or taken by or on behalf of the said party of the first part, in any such actions or suits. And the said party of the second part, for the consideration aforesaid, hath further agreed, and doth hereby further agree, to convey unto the said party of the first part, with warranty against its own acts, all its right, title, or interest in and to any and all the land or mining ground situate in the Eureka Mining District aforesaid, on the southeasterly side of the line hereintofore mentioned, and laid down on the said map hereto annexed, and in and to all ores, precious metals, veins, lodes, ledges, deposits, dips, spurs, or angles, on, in, or under the said land or mining ground, or any part thereof. It being the object and intention of the said parties hereto to confine the workings of the party of the second part to the northwesterly side of the said line continued downward to the center of the earth, which line is hereby agreed upon as the permanent boundary line between the claims of the said parties.

And it is hereby mutually agreed that the notes to be given party, and the deeds and conveyances heretofore provided for, shall be upon the execution of these presents, deposited with D. O. Mills and W. C. Ralston, in the Bank of California, of San Francisco, there to remain until all the said notes shall have been paid and taken up, upon the happening of which event the said deeds and conveyances are to be delivered by the said Mills and Ralston, or either of them, to the respective grantees therein named, their successors or assigns. It is the understanding of the parties hereto that the actions hereintofore recited, are to be forthwith dismissed, and that the party of the second part is to remain in possession of the Lookout ground aforesaid, and at its option work the same from this date.

In witness whereof, the parties hereto have caused these presents to be signed by their respective presidents and secretaries, and their respective corporate seals to be hereunto affixed.

EUREKA CONSOLIDATED MINING COMPANY,

{ EUREKA CON. MINING CO.—INCORPORATED. } By its President, G. T. LAWTON. [SEAL.]

RICHMOND MINING COMPANY OF NEVADA,

{ RICHMOND.—INCORPORATED. } By its President, J. J. CORRIGAN. [SEAL.]
W. W. TRAYLOR, *Secretary.* [SEAL.]

UNITED STATES OF AMERICA.

STATE OF CALIFORNIA, }
CITY AND COUNTY OF SAN FRANCISCO. } *ss.*

I, F. J. Thibault, a commissioner of — for the State of Nevada, duly commissioned and qualified, under and by virtue of the laws thereof, residing in the city and county of San Francisco, State of California, do certify that on the seventeenth day of June, A. D. one thousand eight hundred and seventy-three, before me personally appeared G. T. Lawton, known to me to be the president, and W. W. Traylor, known to me to be the secretary of the Eureka Consolidated Mining Company, a corporation duly organized under the laws of the State of California, who are personally known to me to be the individuals described in, who executed, and whose names are subscribed to the foregoing instrument. The said Eureka Consolidated Mining Company being named in said instrument, and known to me to be the corporation described therein, as a party thereto. And they, the said G. T. Lawton and W. W. Traylor, duly acknowledged to me that they executed the same as such president and secretary, as and for the act and deed of said Eureka Consolidated Mining Company, and that the said corporation executed the same freely and voluntarily, for the uses and purposes therein mentioned, and that the seal which is hereto affixed is the corporate seal of said company, and was thereto affixed by authority thereof. And on the same day before me personally appeared J. J. Corrigan, known to me to be the president of the Richmond Mining Company of Nevada, a corporation duly organized under the laws of the State of Nevada, personally known to me to be the individual described in, who executed, and whose name is subscribed to the foregoing instrument, said Richmond Mining Company of Nevada being named in said instrument, and known to me to be the corporation described therein as a party thereto. And he, the said J. J. Corrigan, duly acknowledged to me that he executed the same as such president, as and for the act and deed of said Richmond Mining Company of Nevada, and that said corporation executed the same freely and voluntarily, for the uses and purposes therein mentioned. And that the seal which is thereto affixed is the corporate seal of said corporation, and was thereto affixed by authority thereof.

In witness whereof, I have hereunto set my hand and affixed my official seal as such commissioner, at my office in the city and county of San Francisco, State of California, this seventeenth day of June, A. D. 1873.

F. J. THIBAULT,
Commissioner for Nevada in California.

Endorsed: Agreement. Dated June 16th, 1873. Filed and recorded at request of Wells, Fargo & Co., June 20, 1873, at 35 minutes past 10 A. M. A. J. Campbell, recorder, by J. C. Maupin, deputy. Book A, Miscellaneous Records, pp. 38-39-40-41-42, Records of Eureka County.

[Here follows map, marked page 31.]

32 "EXHIBIT L."

THE EUREKA CONSOLIDATED MINING COMPANY
(Corporation)
TO
THE RICHMOND MINING COMPANY OF NEVADA.
(Corporation.)

This indenture, made the sixteenth day of June, in the year of our Lord one thousand eight hundred and seventy-three, between the Eureka Consolidated Mining Company, a corporation organized under the laws of the State of California, the party of the first part, and the Richmond Mining Co. of Nevada, a corporation organized under the laws of the State of Nevada, the party of the second part, witnesseth, that the said party of the first part for and in consideration of the sum of five dollars, gold coin of the United States of America, to it in hand paid by the said party of the second party, the receipt whereof is hereby acknowledged, hath granted, bargained, sold, remised, released, and forever quit-claimed, and by these presents doth grant, bargain, sell, remise, release, and forever quit-claim unto the said party of the second part, and to its successors and assigns, all the mining ground situate and being in the Eureka Mining District, Eureka county, State of Nevada, and lying on the northwesterly side of the following line, to wit:

Commencing at the northeasterly corner of the Margaret mining ground or claim, which corner is marked "X" in the map or plan annexed to a certain agreement bearing even date with this indenture, made and entered into by and between the said Eureka Consolidated Mining Company of the first part, and the said Richmond Mining Company of Nevada, of the second part; running thence in a southwesterly direction along the edge of the said "Margaret" ground, the "At Last" ground and the Champion ground, to a point marked "W" on the said map; thence southerly along the edge of the said Champion ground to the northeasterly corner of the Nugget ground; thence in a southwesterly direction along the edge of

the Nugget ground, to the northwesterly corner of the said Nugget ground at the point marked "R" on said map, including the mining claim known as the "Lookout," more particularly described in the patent, No. 392, from the United States to the said party of the first part (and which patent is herewith transferred to the party of the second part), as follows, to wit:

Beginning at a point marked No. 1, "U. S. Survey, No. 43," from which a prominent rocky point No. 2, the summit of Silver Hill, bears south sixty-nine degrees 13 minutes east, at a distance of 7000 three hundred and twenty feet, and the flag-staff in the town of Eureka bears north sixty-three degrees one (1) minute east, at the distance of ten thousand one hundred and forty (10,140) feet; thence from the said post south 38 degrees west, 200 feet to a post m'kd "No. 2, U. S. Survey, No. 43," the same being post No. 4 of survey No. 38, made for the claim of the Eureka Consolidated Mining Company upon the Champion lode, from which the highest point on Ruby Hill, No. 1, bears north fifty-one degrees 30 minutes east, at the distance of 88 feet; thence north thirty-four (34) degrees thirty (30) minutes west, four hundred (400) feet to post m'kd "No. 3, U. S. Survey, No. 43;" thence N. 38 degrees east, 200 feet to the post m'kd "No. 4, U. S. Survey, 43," from which the main shaft upon the "Lookout" lode bears south 29 degrees 15 minutes east, at the distance of 200 feet; thence from said post No. 4 south, 34 degrees 30 minutes east, four hundred feet to the place of beginning, containing 1 acre and seventy-five one hundredths (75-100) of an acre of land, more or less.

Together with all the dips, spurs, and angles, and also all the metals, ores, gold and silver bearing quartz, rock, and earth therein; and all the rights, privileges, and franchises thereto incident, appendant, and appurtenant or therewith usually had and enjoyed; and also all and singular the tenements, hereditaments, and appurtenances thereto belonging or in any wise appertaining, and the rents, issues, and profits thereof; and also all the estate, right, title, interest, property, possession, claim, and demand whatsoever, as well in law as in equity of the said party of the first part, of, in, or to the said premises, and every part and parcel thereof, with the appurtenances.

To have and to hold all and singular the said premises, together with the appurtenances and privileges thereto incident and appendant unto the said party of the second part, its successors and assigns, forever.

In witness whereof, the said party of the first part has hereunto set its hand and seal the day and year first above written.

EUREKA CONSOLIDATED MINING CO.,

{SEAL OF EUREKA CON. MINING CO.} By its President, G. T. LAWTON. [SEAL]

W. W. TRAYLOR, *Secretary*. [SEAL]

Signed, sealed, and delivered in presence of F. J. Thibault.

STATE OF CALIFORNIA,
CITY AND COUNTY OF SAN FRANCISCO. } ss.

I, F. J. Thibault, a commissioner for the State of Nevada, duly commissioned and qualified under and by virtue of the laws thereof, residing in the city and county of San Francisco and State of California, do certify that on the seventeenth day of June, A. D, one thousand eight hundred and seventy three, before me personally appeared G. T. Lawton, known to me to be the president, and W. W. Traylor, known to me to be the secretary of the Eureka Consolidated Mining Company, a corporation duly organized under the laws of the State of California, personally known to me to be the individuals described in and who executed and whose names are subscribed to the foregoing instrument, the Eureka Consolidated Mining Company being named in the said instrument, and known to me to be the corporation described therein as a party thereto; and they the said G. T. Lawton and W. W. Traylor duly acknowledged to me that they executed the same as such president and secretary, and as for the act and deed of the said Eureka Consolidated Mining Company, and that the said corporation executed the same freely and voluntarily for the uses and purposes therein mentioned, and that the seal which is thereto affixed is the corporate seal of said corporation, and was thereto affixed by authority thereof.

In witness whereof, I have hereunto set my hand and affixed my official seal as such commissioner, at my office in the city and county of San Francisco and State of California, this seventeenth day of June, A. D. one thousand eight hundred and seventy-three.

[SEAL] F. J. THIBAULT,
Commissioner for Nevada in California.

Filed for record, and recorded at the request of M. D. Howell, Aug. 19th, A. D. 1873, at 9 o'clock A. M.

A. S. CAMPBELL, *Recorder.*

Book 2, pages 146, 147, 148 of Deeds, Eureka County Records.

33 "EXHIBIT M."

RICHMOND MINING CO. OF NEVADA
TO
EUREKA CONSOLIDATED MINING COMPANY. }

This indenture, made the sixteenth day of June, in the year of our Lord one thousand eight hundred and seventy-three, between the Richmond Mining Company of Nevada, a corporation organized under the laws of the State of Nevada, the party of the first part, and the Eureka Consolidated Mining Company, a corporation organized under the laws of the State of California, the party of the second part, witnesseth, that the said party of the first part for and in consideration of the sum of five dollars, gold coin of the United

States of America, to it in hand paid by the said party of the second party, the receipt whereof is hereby acknowledged, hath granted, bargained, sold, remised, released, and forever quit-claimed, and by these presents doth grant, bargain, sell, remise, release, and forever quit-claim unto the said party of the second part, and to its successors and assigns, all the mining ground situate and being in the Eureka Mining District, Eureka county, State of Nevada, and lying on the southeasterly side of the following line, to wit:

Commencing at the northeasterly corner of the Margaret mining ground or claim, which corner is marked "X" on the map or plan annexed to a certain agreement bearing even date with this indenture, made and entered into by and between the said Eureka Consolidated Mining Company of the first part, and the said Richmond Mining Company of Nevada, of the second part; running thence in a southwesterly direction along the edge of the said "Margaret ground," the "At Last ground," and the "Champion ground," to a point marked "W" on said map; thence southerly along the edge of the said "Champion ground" to the northeasterly corner of the "Nugget ground;" thence in a southwesterly direction along the edge of the said "Nugget ground" to the northwesterly corner of the said "Nugget ground," at the point marked "R" on said map.

Together with all the dips, spurs, and angles, and also all the metals, ores, gold, and silver-bearing quartz, rock, and earth therein; and all the rights, privileges, and franchises thereto incident, appendant, and appurtenant, or therewith usually had and enjoyed; and also all and singular the tenements, hereditaments, and appurnances thereto belonging or in anywise appertaining, and the rents, issues, and profits thereof; and also all the estate, right, title, interest, property, possession, claim, and demand whatsoever, as well in law as in equity, of the said party of the first part, of, in, or to the said premises, and every part and parcel thereof, with the appurtenances.

To have and to hold all and singular the said premises, together with the appurtenances and privileges thereto incident, unto the said party of the second part, its successors and assigns, forever.

In witness whereof, the said party of the first part has hereunto set its hand and seal, the day and year first above written.

RICHMOND MINING CO. OF NEVADA,
By its president, J. J. CORRIGAN. [SEAL.]

Signed, sealed, and delivered in presence of F. J. Thibault.

UNITED STATES OF AMERICA.

STATE OF CALIFORNIA, } ss.
CITY AND COUNTY OF SAN FRANCISCO. }

I, F. J. Thibault, a commissioner for the State of Nevada, duly commissioned and qualified under and by virtue of the laws thereof,

residing in the city and county of San Francisco, State of California, do certify that on the seventeenth day of June, A. D. one thousand eight hundred and seventy-three, before me personally appeared J. J. Corrigan, known to me to be the president of the Richmond Mining Company of Nevada, a corporation duly organized under the laws of the State of Nevada, who is personally known to me to be the individual described in, whose name is subscribed to, and who executed the within instrument, the said Richmond Mining Company of Nevada, being named in said instrument, and known to me to be the corporation described therein as a party thereto; and he the said J. J. Corrigan duly acknowledged to me that he executed the same as such president as and for the act and deed of said Richmond Mining Company of Nevada, and that said corporation executed the same freely and voluntarily for the uses and purposes therein mentioned, and that the seal that is thereto affixed is the corporate seal of said corporation, and was thereto affixed by authority thereof.

In witness whereof, I have hereunto set my hand and affixed my official seal as such commissioner, at my office in the city and county of San Francisco, in the State of California, this seventeenth (17th) day of June, A. D. 1873.

[COMMISSIONER'S SEAL.] F. J. THIBAULT,
Commissioner for Nevada in California.

Recorded at request of P. L. Buckminster, Aug. 19, A. D. 1873, at 15 min. past 9 o'clock A. M.

A. J. CAMPBELL, *Recorder.*

Book 1 of Deeds, pages 105, 106, 107 Records of Eureka County, Nevada.

[Here follows map, marked page 34.]

35 (Endorsed:) In the Circuit Court of the United States for the Ninth Circuit, District of Nevada. The Eureka Consolidated Mining Company, plaintiff, vs. The Richmond Mining Co. of Nevada, Thomas Wren and Joseph Potts, defendants. Amended Bill of Complaint. Filed March 29, 1877. T. J. Edwards, clerk. Service of copy upon defendant's solicitor this day admitted, at Carson City, March 29, 1877. Robt. M. Clarke, solicitor for defendants.

36 In the Circuit Court of the United States in and for the Ninth Circuit and District of Nevada.

THE EUREKA CONSOLIDATED MINING COMPANY,
Complainant,
vs. } In Equity.
THE RICHMOND MINING COMPANY OF NEVADA,
Thomas Wren and Joseph Potts, Defendants.

The separate answer of The Richmond Mining Company of Nevada, to the bill of complaint filed against it and Thomas Wren and Joseph Potts in this honorable court.

This defendant saving and reserving to itself all right of exception to the said bill of complaint, for answer thereto or so much thereof as this defendant is advised is material to answer:

Denies that on the 1st day of September, 1876, or at any other time, the complainant was the owner of, seized in fee or in the possession of, or that thence hitherto complainant has been or still is the owner of or entitled to the possession of that certain mining ground or lode, situated on Ruby Hill, in the Eureka Mining District, in the County of Eureka and State of Nevada, known as the Eureka Consolidated ground or lode, commencing at a point on said lode whence the north corner of United States Survey No. 38 of said Eureka Mining District bears north 38 deg. east, forty-seven (47) feet, and extending south 52 deg. east from said point, along said lode twelve hundred and fifty feet, or of three hundred feet of surface on each side of said portion of said lode, or of any portion of said lode or of said surface, except that portion of said lode, the top or apex of which lies inside of the exterior patent lines of the Sentinel, Mammoth, and Buckeye mining claims of complainant, and that portion of the Champion mining claim of complainant that lies southeast of a line between the mining claims of complainant and the mining claims of defendant, described in a certain agreement between complainant and said defendant, made June 16th, 1873, with the right to follow said portion of said lode upon its dip, and that portion of said surface lying within the limits last above described.

Said defendant further denies that on the 1st day of September, 1876, or at any other time, complainant was the owner, seized in fee, or in the possession of, or that thence hitherto complainant has been, or still is the owner of or entitled to the possession of said lode or any part thereof, throughout its entire depth, lying between vertical planes drawn downward through the following described end lines, to wit, a line passing through said point on said lode, whence
37 the north corner of United States Survey No. 38 of said Eureka Mining District, bears north thirty-eight deg. east, forty-seven (47) feet, and extending from said point north 38 deg. east and south 38 deg. west, and a line parallel to said line passing through a point which is south 52 deg. east, twelve hundred and fifty feet distant from said point whence the north corner of United States Survey No. 38, of Eureka Mining District bears north 38 deg. east 47 feet or any part thereof, except that portion thereof hereinbefore admitted to be in possession of complainant and its property.

Said defendant further denies, that on the 1st day of September, 1876, or at any other time, complainant was the owner of, seized in fee, or in the possession of, or that thence hitherto complainant has been, or now is, entitled to the possession of any lode or lodes, vein or veins, or ledge or ledges, throughout their entire depth or of any part thereof, the tops or apices of which lie inside of the surface

lines last above described extended downward vertically lying between vertical planes drawn downward through the end lines last above described, except that portion of the said lode described in complainant's bill as the Eureka lode, admitted by defendant to be the lode of complainant, and all other lodes, veins, or ledges to which no valid adverse claims existed prior to May 10th, 1872, the tops or apices of which lie within the exterior lines of said Sentinel, Mammoth, and Buckeye mining claims of complainant, and that portion of the Champion mining claim of complainant hereinbefore described.

Said defendant further denies, that on the 1st day of September, 1876, or at any other time, complainant was the owner of, seized in fee, or in the possession of, or that thence hitherto complainant has been or now is entitled to the possession of the surface ground described in complainant's bill, as follows: beginning at a point whence the north corner of United States Survey Number 38 of said Eureka Mining District bears north 38 deg. east, forty-seven (47) feet, and running thence north 38 deg. east, four hundred and forty-seven (447) feet; thence south 52 deg. east, four hundred and fifty-one and two-tenths (451 2-10) feet; thence north 65¼ deg. east, fifty (50) feet; thence south 67 deg. east, three hundred and forty-one (341) feet; thence south 73½ deg. east, one hundred and one (101) feet; thence south 8 deg. east, two hundred and fifty (250) feet; thence south 9¾ deg. east, sixty-eight (68) feet; thence south 38 deg. west, two hundred and fifty-four (254) feet; thence north 76¾ deg. west, one hundred and ten (110) feet; thence north 52 deg. west, seventy-seven and one-half (77½) feet; thence south 38 deg. west, fifty (50) feet; thence south 52 deg. east, three hundred (300) feet; thence south 38 deg. west, two hundred (200) feet; thence north 52 deg. west, three hundred (300) feet; thence south 38 deg. west, one hundred (100) feet; thence north 52 deg. west, seven hundred and eighty-five and four-tenths (785 4-10) feet; thence north 28½ deg. east, one hundred and one and four-tenths (104 4-10) feet; thence north 52 deg. west, one hundred and forty-seven and eight-tenths (147 8-10) feet; thence north 38 deg. east, one hundred and fifty-three (153) feet, to the point of beginning;—or of any portion thereof, except that part included in the exterior lines of the Sentinel, Mammoth, and Buckeye mining claims of complainant and that part of the Champion mining claim of complainant hereinbefore described.

Said defendant further denies that on the 1st day of September, 1876, or at any other time, complainant was the owner of, seized in fee, or in the possession of, or that thence hitherto complainant has been, or now is, entitled to the possession of, or any portion of, any lode or lodes, vein or veins, or ledge or ledges, the tops or apices of which lie inside of the surface lines last above described extended downward vertically lying between vertical planes drawn downwards through the said end lines, to wit, the line passing through said point whence the north corner of United States Survey Num-

ber 38 of said Eureka Mining District bears north 38 deg east, forty-seven (47) feet, and extending north 38 deg. east, and south 38 deg. west; and the line parallel to said line passing through a point which is south 52 deg. east, twelve hundred and fifty (1250) feet, distant from said point whence the north corner of United States Survey Number 38 of said Eureka Mining District bears north 38 deg. east forty-seven (47) feet; except that portion of said premises, lode, vein, and ore thereof, contained, included, enclosed, and confined within the following surface lines drawn downward vertically, to wit: beginning at a point whence the northwest corner of the Buckeye or southwest of the Champion bears south 52 deg. east, two hundred and two and two-tenths (202 2-10) feet; running thence north 52 deg. west, one hundred and forty-seven and eight-tenths (147 8-10) feet; thence north 38 deg. east, one hundred and fifty-three (153) feet; thence south 6 deg. east, two hundred and twelve and eight-tenths (212 8-10) feet, to the point of beginning, except that portion of said lodes, veins, or ledges and surface ground hereinbefore admitted to be the property of complainant.

38 And this defendant further answering, denies that complainant owns or holds all of that portion of the property or premises described in complainant's bill not embraced in the patents described in said bill or any part thereof, or that complainant has owned or held said portion of said property or premises or any part thereof for more than five years next preceding the commencement of this suit, or for any length of time preceding the commencement of the action, in the manner required by the mining laws of the Eureka Mining District, or in conformity with the laws applicable thereto, prescribing the mode of holding or possessing the public mineral land of the United States, or otherwise.

This defendant further answering, denies that it followed down on the dip of its lode to the north, but alleges that said lode dips to the northeast, and that defendant followed the said Richmond lode on its dip to the northeast.

And this defendant further answering, denies that by its agent, J. J. Corrigan, or otherwise, it agreed in the written instrument set out in complainant's bill, dated June 10th, 1873, and signed by J. W. Shaw and J. J. Corrigan, to compromise or settle the controversy or litigation then existing between it and complainant.

And this defendant further answering, denies that said Corrigan had any authority to make said agreement for or on behalf of defendant, or that defendant ever in any manner ratified said agreement.

And this defendant further answering, denies that it ever by agent, or otherwise, entered into any agreement to continue any boundary line continuously or indefinitely between the mining claims of complainant and the mining claims of defendant.

And this defendant further answering, denies that it ever was agreed or understood by or between the complainant and defend-

ant, or that it was their object, wish, or intention that the Champion end line described in complainant's bill should continue across the hill indefinitely, or should be the continuous or permanent dividing or boundary line in that direction between the mining claims and works of complainant and defendant.

And this defendant further answering, denies that the line from "W to C," on complainant's map, attached to complainant's bill, and marked "Exhibit N," is the correct end line of the Champion mining claim of complainant.

And this defendant further answering, admits that there is a zone or belt of quartzite lying to the southwest of the ore bodies found in the mining claims of complainant and defendant, but denies that it dips to the north or that it forms the foot wall of said ore-bodies or any of them, except at a few points where the ore touches it for very short distances.

And this defendant further answering, alleges that ore-bodies are found in said quartzite in a number of places.

And this defendant further answering, denies that the shale described in the complainant's bill is the hanging or any wall of the lodes or ore-bodies described in complainant's bill or any of them, except at a few isolated points at which the ore touches the shale, and at those points for short spaces only, but the defendant alleges that the limestone and shale overlying the quartzite is the country rock.

And this defendant further answering, denies that the or any foot and hanging wall of said ore-bodies or lodes, or any of them, are found two hundred and six (206) feet apart on the tenth level of complainant, or that any foot and hanging wall is found on the seventh level of the defendant about two hundred and thirty feet apart.

And this defendant further answering, denies that no ore-bodies are found in the limestone described as the country limestone in complainant's bill, but alleges that ore is found in said limestone in many places.

And this defendant further answering, denies that the ore found between the said quartzite and shale is most frequently found lying on the quartzite, but alleges that it is very seldom found lying on or against the quartzite or shale.

And this defendant further answering, denies that all or any considerable number of the said ore-bodies can be traced to the said pretended quartzite foot wall, but avers that very few of said ore-bodies can be traced to said pretended quartzite foot wall.

And this defendant further answering, denies that there are no hanging or foot walls of a lode between said pretended quartzite foot wall and shale hanging wall of the lode described in complainant's bill, but alleges that there are hanging and foot walls of at least two lodes between said pretended quartzite foot and said pretended shale hanging wall.

And this defendant further answering, denies that the Potts' chamber, or any part thereof, or any ore found in the workings of
39 the Richmond shaft are on or a part of the lode described in complainant's bill, or that that, or any portion of the Potts' chamber, or any part thereof, or of the sixth or seventh levels, or any part thereof from said Richmond shaft, southeast of the line marked W. C., described in complainant's bill, are or is a part of or within any part of the or any lode owned or possessed by complainant or granted to complainant by the patents, marked A, B, C, D, E, F, or G, or any or either of them.

And this defendant further answering, denies that it has taken thirty-five thousand (35,000) tons of ore from any chambers or levels to the southeast of said line W. C., but avers that it has taken only about ten thousand tons southeast of said line. And this defendant denies that said ore was of the value of seventy (70) dollars a ton, or of any value whatever.

And this defendant further answering, denies that it ever concealed the fact that it was taking ore out southeast of said line from complainant.

And this defendant further answering, denies that on the second day of September, 1876, or at any other time, by its agents, employees, servants, or confederates, or otherwise, it entered into any portion of the property or premises of the complainant. And defendant denies that any portion of the property or premises of the complainant has been exposed, opened, cut, or worked in the drifts, excavations, levels, or chambers from the said Richmond shaft, or that thence hitherto defendant has, or that it now does withhold from complainant the possession of said premises or any part thereof, or that it is working or mining on said premises or any part thereof, or taking therefrom or converting to its own use a large, or any quantity of silver, or earth, or rock. And the defendant denies that any portion of the premises which has been exposed, opened, cut, and worked in the drifts and excavations, levels, and chambers from the said Richmond working shaft is the property of the plaintiff, but avers that all and each portion thereof is the property of the defendant. Defendant admits that at the commencement of this action it was taking out and removing ore from the Potts' chamber and other excavations, southeast of said line W. C., but denies that it was of the value of seventy ($70.00) dollars a ton, or of any value whatever.

And further answering, this defendant denies that it ever threatened or that it now threatens to take any ore out of the premises of the complainant or any part thereof, or that it will take any ore or rock from said premises unless restrained by the order of this court, but it admits that it threatened to and did take ore from the Potts' chamber and other excavations southeast of said line W. C.

And further answering, this defendant denies that it, the said Richmond Mining Company of Nevada, is insolvent and unable to

respond in damages for any acts or injuries which have been or may be committed by it, and avers that it is perfectly solvent and able to respond in money for all its debts and liabilities of any character whatever.

This defendant, having now fully answered, prays to be hence dismissed with its reasonable costs and charges, in this behalf most wrongfully sustained.

THOS. WREN,
Solicitor for Defts.

WILLIAMS & THORNTON,
WILSON & WILSON,
Of Counsel for Defts.

UNITED STATES OF AMERICA,
NINTH CIRCUIT,
DISTRICT OF CALIFONRIA. } *ss.*

Edward Probert, being duly sworn, deposes and says that he is an officer of the Richmond Mining Company of Nevada, the above named defendant, and has authority to verify the foregoing answer; that he has read the above answer and knows the contents thereof, and that the same is true, of his own knowledge, except as to the matters therein stated on information and belief, as *as* to those matters he believes it to be true.

EDWD. PROBERT.

Subscribed and sworn to before me, this 12th day of May, A. D. 1877.

JOS. F. O'BEIRNE,
Commissioner of the U. S. Circuit Court,
District of California.

40 (Endorsed:) No. —. U. S. Circuit Court of the District of Nevada. The Eureka Consolidated Mining Company, complainant, vs. The Richmond Mining Company of Nevada, et als., defendants. Separate answer of the Richmond Mining Co. of Nevada. Filed May 14, 1877. T. J. Edwards, clerk.

41 In the Circuit Court of the United States in and for the Ninth Circuit and District of Nevada.

THE EUREKA CONSOLIDATED MINING COMPANY,
Complainant,
vs.
THE RICHMOND MINING COMPANY OF NEVADA,
Thomas Wren, and Joseph Potts, Defendants. } In Equity.

The replication of the Eureka Consolidated Mining Company, complainant, to the answer of the Richmond Mining Company of Nevada, defendant.

This repliant, saving and reserving to itself all and all manner of advantage of exception to the manifold insufficiencies of the said answer, for replication thereto, saith, that it will aver and prove its said bill to be true, certain, and sufficient in law to be answered unto; and that the said answer of the said defendant is uncertain, untrue, and insufficient to be replied to by this repliant without this, that any other matter or thing whatsoever in the said answer contained, material or effectual in the law to be replied unto, confessed, and avoided, traversed, or denied, is true; all which
42 matters and things this repliant is and will be ready to aver and prove, as this honorable court shall direct; and humbly prays, as in and by its said bill it hath already prayed.

GARBER & THORNTON,
Solicitors for Complainant.

S. HEYDENFELDT AND
H. K. MITCHELL, *of Counsel.*

(Endorsed:) In Circuit Court of the United States, 9th Circuit, District of Nevada. The Eureka Consolidated Mining Company, complainant, vs. The Richmond Mining Company of Nevada, defendant. Replication. Due service of within replication admitted, this 13th day of June, A. D. 1877. Thos. Wren, atty. for defendant, per Russell J. Wilson. Filed June 14, 1877. T. J. Edwards, clerk.

43 In the Circuit Court of the United States in and for the Ninth Circuit and District of Nevada.

THE RICHMOND MINING COMPANY OF NEVADA, Complainant,
vs.
THE EUREKA CONSOLIDATED MINING COMPANY, Defendants.
} In Equity.

To the Judges of the Circuit Court of the United States for the Ninth Circuit and District of Nevada, sitting in equity.

The Richmond Mining Company of Nevada, which is a corporation created, organized, and existing under and by the laws of the State of Nevada, having its prineipal place of business at Eureka, in the County of Eureka, in said state, brings this, its amended cross-bill, against the Eureka Consolidated Mining Company, which is a corporation created, organized, and existing under and by the laws of the State of California, having its principal place of business at San Francisco, in said State of California, and thereupon your orator complaining, shows to your honors that on the 20th day of February, 1877, complainant was the owner of and in the lawful possession, and thence hitherto has been, and still is, the
44 owner of and entitled to the possession of those certain mining grounds and lodes bearing silver and other valuable min-

erals, situated on Ruby Hill, in the Eureka Mining District, in County of Eureka and State of Nevada, and more particularly scribed as follows, to wit: commencing at the northeast corner the Atlantic mining claim, whence the Richmond shaft bears nort. 86½ deg. west, nine hundred and forty (940) feet, and running thence south 38 deg. west, seven hundred and ninety-seven and six-tenths (797 $^{6}_{10}$) feet, to the southerly boundary of the mining claim known as the Utah; thence along the southerly boundary of the said Utah claim, north 62½ deg. west, six hundred (600) feet; thence north 38 deg. east, seven hundred and ninety-seven and six-tenth (797 $^{6}_{10}$) feet, to the northerly line of the said Atlantic claim, and thence south 62½ deg. east, six hundred (600) feet, to the place of beginning, together with all the veins, lodes, ledges, dips, deposits, and bodies of ore bearing silver and other precious metals therein or thereunder, as appears by map marked "Exhibit No. 1," hereunto attached and asked to be taken as a part of this bill.

And your orator further shows unto this honorable court that the said defendant, on the 21st day of February, 1877, by itself and its agents, servants, employees, and confederates entered into
45 and upon the property and premises above described and ousted and ejected the complainant from those portions of the tracts called the Arctic and Utah, which are marked on the annexed map marked "Exhibit No. 1," as eighth and ninth levels, and the branches, drifts, chambers, and excavations connected therewith, and particularly from the drifts, cuts, excavations, and chambers near the northern end of said ninth level, which are also marked on the said annexed map by the letter A; and that the said defendant unlawfully cut, made, and excavated said levels and branches, drifts, and cuts into and upon and under the said lands of the complainant, and from thence hitherto has and now does wrongfully and unlawfully withhold from complainant the possession of said portions of said property and premises, and since said date has worked and mined the same, and taken therefrom and converted to its own use large quantities of silver and other valuable mining ore, earth, and rock found therein, amounting to more than one hundred (100) tons, of the value of more than $30 per ton, thereby injuring and to a great extent destroying said property and premises, which are only valuable as containing mineral-bearing ore, earth, and rock.

And your orator further shows unto the court, that by said
46 conduct and acts the said defendant has greatly injured the value of said property by taking the valuable mineral substance thereof found therein, removing the same, and converting it to their own use.

And your orator further shows unto the court that the said defendant threatens to continue said trespass, waste, and injuries so soon as a restraining order, granted by the judge of the District Court of the Sixth Judicial District of the State of Nevada, in and

for the County of Eureka, is annulled and avoided, unless restrained by the order and injunction of this honorable court.

And your orator further shows unto the court that the said defendant has laid claim to the premises above described and owned by this complainant, and on the —— day of ———, 18—, instituted an action in the said Sixth District Court of Nevada in and for the County of Eureka, against this complainant, Thomas Wren, and Joseph Potts, to recover the possession of all that portion of the premises *first* above described, with the exception of the ore-body marked in "Exhibit No. 1" with the letter A, the possession of which it unlawfully holds against this complainant. That in said suit it sought and obtained a restraining order, enjoining and restraining this complainant from working the demanded
47 premises and taking therefrom ore, earth, or rock bearing silver or other valuable minerals.

And your orator further shows unto this court that the complainant filed its answer to the said action so brought as aforesaid in the Sixth District Court of the State of Nevada, therein asserting the said title of the complainant to the said premises and asking equitable relief, and obtained an order restraining the said defendant and its agents, servants, and employees from working any ore-bodies on said premises first above described, or taking therefrom any ore, earth, or rock bearing silver or other valuable minerals.

And your orator further shows unto this court, that the said case so brought as aforesaid in the said Sixth District Court of Nevada, was upon the petition of the said defendant herein removed into this honorable court, under the provisions of an act of Congress entitled "An act to determine the jurisdiction of circuit courts of the United States, and to regulate the removal of causes from state courts, and for other purposes," approved March 3, 1873; and that said case is now pending herein. That after the removal of said case as aforesaid, the said defendant amended its pleadings by leave of court, so as to strike from said complaint all demands for equitable relief, and thereupon filed its bill in equity against the com-
48 plainant, wherein it claimed to be the owner in fee and entitled to the possession of all that tract of land first herein described, and which is owned by the complainant, and asserted that the complainant was in the possession of a large portion thereof, and was working the same, and taking therefrom large quantities of ore, earth, and rock bearing silver and other valuable mineral substances, and praying that this complainant be restrained from working the said premises first above described, and from taking therefrom any ore, earth, and rock bearing silver, or other mineral substances, and for general relief.

And your orator further shows to this honorable court, that unless the said defendant, its agents, servants, and employees, are restrained and enjoined from working, taking, and carrying away ore, earth, and rock bearing silver and other valuable minerals

from the premises aforesaid, the value and substance of said premises will be destroyed, and the complainant will suffer irreparable injury.

And your orator further shows to this honorable court, that the said defendant herein is insolvent, and unable to respond in damages for the acts and injuries heretofore committed, or which may hereafter be committed by it.

49 And your orator further shows to your honors, and avers that the said Thomas Wren and Joseph Potts, impleaded with the complaint as aforesaid, have no right, claim, title, or interest whatever in or to the premises, lodes, runs, ledges, dips, and deposits hereinbefore described, but are and were during all the time aforesaid, merely officers of the complainant as a corporation.

In consideration whereof, and forasmuch as your orator is entirely remediless in the premises, at and according to the strict rules of the common law, and can have relief only in a court of equity, where matters of this nature are properly cognizable and relievable: to the end therefore that the said defendant, the Eureka Consolidated Mining Company and its agents, servants, employees, and confederates, if any, may be restrained from the doing of said acts threatened, and from the continuance of further trespass and waste upon said property and premises, may upon its oath full, true, direct, and perfect answer make to all and singular the matters and things hereinbefore stated and charged, as fully and particularly as if the same were hereinafter repeated and it thereunto distinctly interrogated, and that not only as to the best of its knowledge and remembrance, but also to the best of its information and belief.

May it please your honors to grant to your orator a writ
50 of injunction *pendente lite*, issuing out of, and in accordance with, the rules and practice of this honorable court, to be directed to the said defendant, to restrain it and its agents, servants, employees, and confederates from entering into or upon the mine, mining ground, lode, property, and premises first hereinbefore described, or any part thereof, and from working or mining thereon, or taking or removing therefrom any silver or any other valuable mineral-bearing ore, earth, or rock, or any mineral substance whatever, whether the same be in place or heretofore severed from the said freehold; as also a restraining order to the same effect, until an application for such injunction can be heard, and that at the final hearing such injunction may be made perpetual; and that an account be taken of the waste already committed; and for such other and further relief as to this court may seem just and meet.

And may it please your honors to grant to your orator the most gracious writ of subpœna of the United States of America, to be directed to the said defendant, the Eureka Consolidated Mining Company, thereby commanding it, at a certain day, and under a certain pain, therein to be specified, personally to be and appear

before your honors in this honorable court, and then and
51 there to answer all and singular the premises, and to stand to perform and abide such order and decree therein as to your honors shall seem meet, and your orator will ever pray.

THOS. WREN,
Solicitor for Complainant.

WILLIAMS & THORNTON, AND
WILSON & WILSON,
Of Counsel for Complainant.

UNITED STATES OF AMERICA,
NINTH CIRCUIT,
DISTRICT OF CALIFORNIA.

Edward Probert, being duly sworn, deposes and says that he is an officer of the Richmond Mining Company of Nevada, the complainant, and has authority to verify the foregoing complaint; that he has read the foregoing complaint and knows the contents thereof, and the same is true of his own knowledge, except as to the matters therein stated on information and belief, and as to those matters, he believes it to be true.

EDWD. PROBERT.

Subscribed and sworn to before me, this 12th day of May, A. D. 1877.

JOS. F. O'BEIRNE,
Commissioner of U. S. Circuit Court, Dist. of Cala.

[Here follows map, marked page 52.]

53 (Endorsed:) U. S. Circuit Court for the District of Nevada. The Richmond Mining Company of Nevada, complainant, vs. The Eureka Consolidated Mining Company, defendant. Amended cross-bill. Filed May 14, 1877. T. J. Edwards, clerk.

54 In the Circuit Court of the United States in and for the Ninth Circuit and District of Nevada.

THE RICHMOND MINING COMPANY OF NEVADA,
Complainant,
vs.
THE EUREKA CONSOLIDATED MINING COMPANY,
Defendant.
} In Equity.

The answer of the Eureka Consolidated Mining Company to the amended cross-bill filed against it in this honorable court.

This defendant, saving and reserving to itself all right of exception to the said cross-bill, for answer thereto, or so much thereof as this defendant is advised it is material to answer:

Denies that on the 20th day of February, A. D. 1877, or at any time, complainant was the owner of or in the lawful or other possession of or thence hitherto or at any time has been or still is the owner of or entitled to the possession of the premises described in the said cross-bill, or any part thereof.

55 And this defendant denies that this defendant on the 21st day of February, A. D. 1877, or at any time, by itself or by its agents, servants, employees, or confederates, ousted or ejected complainant from those portions of said premises called the Arctic and Utah, or from those portions of said premises marked on the said map "Exhibit No. 1" as eighth and ninth levels, and the branches, drifts, chambers, and excavations connected therewith, or from the drifts, cuts, excavations, and chambers near the northern end of said ninth level, which are marked on said map by the letter A, or from any portion or part of said premises.

And this defendant denies that this defendant unlawfully cut, made, or excavated said levels, branches, drifts, and cuts, or any of them, or any levels, branches, drifts, or cuts whatever; and this defendant denies that this defendant cut, made, or excavated said levels, branches, drifts, and cuts, or any of them, or any levels, branches, drifts, or cuts into, upon, or under any land of complainant; and this defendant denies that this defendant from thence hitherto or at, or from any time, has wrongfully or unlawfully withheld, or now does wrongfully or unlawfully withhold, from complainant the possession of said or of any portions of said premises.

And this defendant denies that this defendant has ever laid claim to any premises owned by complainant.

56 And this defendant denies that it unlawfully holds against complainant possession of the ore-body marked in Exhibit No. 1 with the letter A, or any part thereof.

And this defendant denies that unless defendant, its agents, servants, and employees, or any of them, are restrained or enjoined from working, taking, or carrying away ore, earth, and rock bearing silver and other valuable minerals from the said premises, complainant will suffer irreparable injury or any injury.

And this defendant denies that this defendant is insolvent and unable to respond in damages for any acts or injuries which have been or may be committed by it, and avers that it is perfectly solvent and able to respond in money for all its debts and liabilities of any character whatever.

This defendant having now fully answered, prays to be hence dismissed with its reasonable costs and charges in this behalf most wrongfully sustained.

GARBER & THORNTON,
Solicitors for Defendant.

S. HEYDENFELDT AND
H. K. MITCHELL,
Of Counsel for Defendant.

UNITED STATES OF AMERICA,
NINTH CIRCUIT,
DISTRICT OF CALIFORNIA. } *ss.*

S. Heydenfeldt, being duly sworn, deposes and says that
57 he is an officer of the Eureka Consolidated Mining Company, the above named defendant, and has authority to verify the *the* foregoing answer; that he has read the above answer and knows the contents thereof, and that the same is true of his own knowledge, except as to the matters therein stated on information and belief, and as to those matters, he believes it to be true.

S. HEYDENFELDT.

Subscribed and sworn to before me, this 13th day of June, A. D. 1877.

L. S. B. SAWYER,
Comr. U. S. Circuit Court, 9th Cir., Dist. Cal.

(Endorsed:) U. S. Circuit Court, District of Nevada. The Richmond Mining Company of Nevada, complainant, vs. The Eureka Consolidated Mining Company, defendant. Answer to amended cross-bill. Filed June 14, 1877. T. J. Edwards, clerk. Due service of within answer admitted this 13th day of June, A. D. 1877. Thos. Wren, atty. for deft., per Russell J. Wilson.

58 In the Circuit Court of the United States in and for the Ninth Circuit and State of Nevada.

THE RICHMOND MINING COMPANY OF NEVADA,
Complainant,
vs.
THE EUREKA CONSOLIDATED MINING COMPANY,
Defendant. } In Equity.

The replication of the Richmond Mining Company, complainant, to the answer of the Eureka Consolidated Mining Company.

This repliant, saving and reserving to itself all and all manner of advantage of exception to the manifold insufficiencies of the said answer, for replication thereto saith that it will aver and prove its said bill to be true, certain, and sufficient in law to be answered unto; and that the said answer of the said defendant is uncertain, untrue, and insufficient to be replied to by this repliant, with-
59 out this, that any other matter or thing whatsoever in the said answer contained is material or effectual in the law to be replied unto, confessed and avoided, traversed or denied, is true; all which matters and things this repliant is and will be ready to

aver and prove as this honorable court shall direct. And humbly prays as in and by its said bill it hath already prayed.

THOS. WREN,
Solicitor for Complainant

SAMUEL M. WILSON,
ROBERT M. CLARKE,
JOHN J. WILLIAMS,
C. J. LANSING,
A. M. HILLHOUSE, AND
CRITTENDEN THORNTON,
Of Counsel.

(Endorsed:) U. S. Circuit Court, District of Nevada. The Richmond M'g Co. of Nevada v. The Eureka Con. Mining Company. Replication. Filed August 15, 1877. T. J. Edwards, clerk.

60 In the District Court of the Sixth Judicial District of the State of Nevada, in and for the County of Eureka.

THE EUREKA CONSOLIDATED MINING COMPANY, PLAINTIFF,
vs.
THE RICHMOND MINING COMPANY OF NEVADA, THOMAS WREN, and JOSEPH POTTS, DEFENDANTS.

Upon reading and filing the petition of the above-named, the Eureka Consolidated Mining Company, plaintiff herein, for the removal of this suit unto the Circuit Court of the United States for the District of Nevada, in the Ninth Circuit, in pursuance of the laws of the United States relating to the removal of suits from the state courts, and upon filing the security offered by said plaintiff, according to the requirements of said laws; and on motion of H. J. Thornton, attorney for said plaintiffs, it is hereby ordered that the said petition and security be accepted, and that the said suit be removed unto the next circuit court of the United States, to be held in the said district of Nevada, in the said ninth circuit, and
61 that no further proceedings be had in said suit in this court.

Witness the Hon. F. W. Cole, judge of the District Court of the Sixth Judicial District of the State of Nevada, in
[L. S.] and for the County of Eureka, and the seal of said court, this 7th day of March, A. D. 1877.

F. H. HARMON, *Clerk.*

(Endorsed:) Filed in the office of the clerk of the Circuit Court of the United States for the District of Nevada, this 24th day of March, 1877. T. J. Edwards, clerk.

62 In the Circuit Court of the United States in and for the Ninth Circuit and District of Nevada.

THE EUREKA CONSOLIDATED MINING COMPANY
vs.
THE RICHMOND MINING COMPANY OF NEVADA, Thomas Wren and Joseph Potts.

It is stipulated and agreed that the several causes now pending in the above-entitled court, between the above-named parties, both at law and in equity, including issues on bills and cross-bills, shall be tried on the 23d day of July next, and such subsequent days as may be necessary to complete the same, before the Honorables Stephen J. Field, Lorenzo Sawyer, and Edgar W. Hillyer, (or any two of them in the case of the inability or failure of the other to sit,) without a jury, and such evidence, oral and written, as the parties may respectively submit, subject however to all objections as to competency, relevancy, and materiality; that such trial shall be had at the City and County of San Francisco, California, with the same force and effect as if tried at the City of Carson, State of Nevada,
63 and that the respective judgments and decrees shall be entered in said respective cases in term time at said last-named place, with the same force and effect as if the whole trial and proceedings took place at said City of Carson. And if it be necessary for the purpose of carrying out the spirit and intent of this stipulation, the evidence shall be considered as taken by said judges as commissioners or other officers, and the causes be regarded as submitted for decision thereupon at said Carson City, and that the said judges, or the judges who shall hear said causes, shall be empowered, by virtue of this stipulation, to make any and all orders in each and all of said causes by them deemed necessary to effectuate this stipulation.

Nothing however shall prevent either of the parties hereto from making all proper motions for new trials and rehearing, and from prosecuting any and all appeals or writs of error, as in ordinary modes of trial.

GARBER & THORNTON,
Solicitors for Complainant and Attorneys for Plaintiff.

THOS. WREN,
Solicitor for Defts. and Atty for Defts.

SAN FRANCISCO, *June 1st*, 1877.

64 (Endorsed:) In U. S. Circuit Court, Dist. Nevada. Eureka Con. M. Co. vs. Richmond M. Co. et als. Stipulation. Filed June 4, 1877. T. J. Edwards, clerk.

65 In the Circuit Court of the United States in and for the Ninth Circuit and District of Nevada.

EUREKA CONSOLIDATED MINING COMPANY
vs.
RICHMOND MINING COMPANY OF NEVADA.

MONDAY, *July* 23, 1877.

Counsel appearing—for plaintiff, Messrs. Heydenfeldt, Mitchell, Messick, and Garber & Thornton; for defendant, Messrs. Wilson, Clarke, Hillhouse, Williams, Lansing, Thornton, and Wren.

Mr. Thornton makes opening statement for the plaintiff.

Counsel for plaintiff moves that all witnesses be excluded from the court-room, which motion is denied by the court.

66 Testimony of THOMAS J. READ, called for plaintiff, sworn.

Mr. Thornton.—Question. Where do you reside?

Answer. Eureka, Nevada.

Q. How long since you have resided there?

A. I have resided in that portion of Nevada since 1863.

Q. In what portion of Nevada do you mean?

A. In Eastern Nevada.

Q. What is your occupation?

A. Civil engineer and surveyor.

Q. How long have you been engaged in that occupation?

A. Since 1857.

Q. Have you ever surveyed any mines?

A. I have been engaged in mining engineering since 1863.

Q. In what districts have you been engaged during that time, in surveying mines?

A. In nearly all the districts of Eastern Nevada.

Q. Name some of them.

A. Reese River, Eureka, Woodbine, Pioche, Ward, Cherokee, Belmont, and several others.

Q. In connection with your surveys of the mines in this district, have you performed any other duty in the mines?

A. As U. S. deputy mineral surveyor, I have surveyed mines for patents.

Q. State some of the mines that you have surveyed as a mining engineer in the several districts you have named.

A. Raymond and Ely, Washington, and Pioche; and all of the mines of Treasure Hill, I believe; the Ward Beecher, the Eberhardt, Onward, the North and South Aurora, the Imperial, and many others.

67 Q. What other districts and mines in them?

A. In Eureka; I have surveyed in the Richmond, the Eureka, the K. K., the Phœnix, the Jackson, the Hamburg, the Adams' Hill, and nearly all of the mines in the Eureka Mining District.

Q. What mines in Lander county?

A. The Manhattan Company's mines, and nearly all of the other mines in the district that were open, up to 1868.

Q. Has this been your sole and only occupation since 1863; or have you had any other occupation?

A. I have had no other occupation, except that of U. S. deputy mineral surveyor.

Q. What duties did you perform in that office?

A. Surveying mines and procuring U. S. mine patents.

Q. That referred more particularly to the surface of the ground?

A. Yes, sir.

Q. When did you first see the Eureka Consolidated, the Richmond, the K. K., and the Jackson mines?

A. In 1869, I think.

Q. When did you commence surveying in any of them?

A. About 1869 or '70; I will not be certain of the time.

Q. How familiar are you with those mines and the working of them?

A. I believe I know all the underground workings of the mines you have mentioned.

Q. Are you familiar with the surveys of them?

A. Yes, sir.

Q. Did you make that map marked "map of the Eureka mine and adjacent mines?" (Ex. A.)

68 A. I did.

Q. Is the point of the compass contained on that map?

A. It is on the upper left-hand corner, by an + and letters N. S. E. W.

Q. What is the scale of that map?

A. Forty feet to the inch. It is mentioned in the lower right-hand corner.

Q. From what sources is that map made?

A. From actual survey.

Q. By whom?

A. By myself.

Q. Where are those mines situated?

A. On Ruby Hill and Ruby Mining District, Eureka county, Nevada.

Q. What mines are shown on that map?

A. The mines of the Richmond Company, the Eureka Consolidated Company, and the workings of the K. K. Co.

Q. Point out the mines of the Richmond Company that are on that map. Lookout, Richmond, and Tip-Top. Now, what are the lines of the Richmond mine, or the surveys, as marked on that map?

A. The black lines that bound the words Lookout, Richmond, and Tip-Top, with the exception that Tip-Top extends further over to the left than is shown upon the map.

Q. Is that a correct representation of the Lookout claim, upon

the surface, as marked by the black line surrounding the words "Lookout?"

A. It is.

Q. Is it a correct representation of the Richmond patented ground, as marked by the black line around the word "Richmond?"

69 A. It is.

Q. And it is not an accurate representation of the Tip-Top, in the respect you have described?

A. No, sir.

Q. Point out and name the different patents of the Eureka Consolidated Mining Company, as represented on that map.

A. [Pointing]. The Nugate, Savage, Champion, the Buckeye, the At Last, the Mammoth, the Sentinel, the Elliptic, the Lapotai, and the Margaret. The Eureka Consolidated includes all of those mining claims.

Q. Are you familiar with those patents that have been granted for those claims, and the description of the land in them?

Ans. Yes, sir.

Q. Does that map represent and give a description of the grounds granted to the Eureka Mining Company?

A. Yes, sir.

Q. From what sources did you take the representation of the Lookout, the Richmond, and the Tip-Top?

A. The Lookout, from my surveys; the Richmond and Tip-Top, from notes in the U. S. surveyor's office, Eureka, Nevada.

Q. Is that description the same as appears in the patent?

A. I haven't compared it with the patent.

Q. Were those the surveys upon the patent, so granted?

A. Yes, sir; and copies from the official plats filed in the U. S. land office, and from the United States surveyor-general's office.

Q. Upon that map, where is the line X. W.?

[Witness shows.]

70 Q. Along what lines or pass does that line run?

A. Along the Margaret, between the At-Last and Lookout; between the Champion and Richmond, to that point [showing].

Q. What end line of the Margaret to the Champion is that?

A. The northwest end line.

Q. What end line of the Lookout and Richmond?

A. The southeast.

Q. Are you familiar with the formation of Ruby Hill?

A. I am.

Q. What kind of rock composes it?

A. Quartzite and limestone.

Q. Where does the quartzite lay, with regard to the hill?

A. South.

Q. On the south side?

A. On the south side.

Q. What is the width or thickness of that quartzite?

A. I don't know; I don't think it has ever been developed so as to show the thickness at any point.

Q. Would it exceed several hundred feet?

A. Drifts have been run in it for several hundred feet without finding its width.

Q. What else next north of that quartzite?

A. Limestone.

Q. How large a body of limestone?

A. Varying from 700 or 800 feet to about 200 feet in width.

Q. Where is it widest?

A. The widest place that I have found is at the Richmond, or near the dividing line; near the line X. W.

71 Q. Near the surface, at a right angle to the quartzite, what is the width of that body of limestone at that point, or near it?

A. About 450 feet across, at the Bell shaft.

Q. Point out the Bell shaft.

[Witness points it out on the map.]

Q. Whose ground is the Bell shaft on?

A. The Eureka Company's ground.

Q. What lays immediately north of the limestone?

A. Clay shale and a clay seam.

Q. You say that the width of the limestone at that point and at right angles to the wall is about 450 feet?

A. Yes, sir.

Q. What would be the distance from the shale to the quartzite across at that point, going over the surface, not at right angles to the walls? Estimate it.

A. About 800 feet.

Q. At right angles to the walls you say the distance between them is about 450 feet at that point?

A. Yes, sir.

Q. What is the thickness at that clay shale?

A. In some places it would be 40 or 50 feet thick, and in some places very thin, not a quarter of an inch.

Q. About where upon that map is the dividing line between this body of limestone you have mentioned and the quartzite?

A. It is south of this croppings marked S. A. and S. B.

Q. Point out on that map, and give the letters or names for them, all of the croppings on the ground of the Eureka Mining Co., beginning at the west and going to the east.

A. They are represented by S A, S B, S C, S D, S E, S F, S G, S H, S I, S J, S K.

72 Q. You have named the letters which are marked on the representations of all the croppings on the Eureka grounds, have you?

A. I have, sir.

Q. In what color are those croppings represented?

A. Brown.

Q. Do those brown marks correctly represent the croppings that are actually upon the ground?

A. They do.

Q. In extent or size as developed, or as apparent to the eye?

A. Yes, sir.

Q. How near are the croppings in the Champion and Buckeye, to the contact between the quartzite and the limestone?

A. I could only give you that distance approximately; about 60 feet.

Q. What is the distance in a straight line, north and south, or in a straight line across the lode at right angles to the quartzite, between the most southern and the most northern croppings that you have pointed out?

A. 480 feet.

Q. That is between the croppings of the Buckeye, marked S. A., and what other croppings?

A. S. K.

Q. What croppings do you find on the Richmond and Tip-Top or Lookout ground?

A. Croppings at the top of the Tip-Top incline.

Q. Have you marked out the extent of those croppings upon the map?

A. I have not, sir.

Q. Can you make an approximate estimate of the size of those croppings?

73 A. I would like to examine my notes on that point before I state it.

Q. Have you notes showing the extent of those croppings?

A. No, sir; I haven't them here.

Q. Is there any croppings between the Tip-Top and the Richmond, that you have pointed out, and the Champion croppings?

A. There are.

Q. At what point?

A. Points from which I had assays taken; about point H. in the word Richmond, and near the point W.

Q. Do you say that from those points you took specimens for assay?

A. I did.

Q. Were they specimens of ore?

A. They were specimens of ore.

Q. Were they fixed in the ground; were they there naturally?

A. They were there naturally.

Q. Do you know a point there called the Iron shaft?

A. I have not it down on the map; I could locate it for you at any time.

Q. Well, locate it.

A. It would take me some time.

Q. About where is the Iron shaft?
A. [Witness marks it "A" on the map.] It is near that point A.
Q. Were there any croppings at the surface in the Iron shaft?
A. There were croppings of ore.
Q. Can you describe them; their position or the extent of them?
74 A. There was a seam of ore there at what is known as the Iron shaft; in the limestone.
Q. What is the depth to which the Iron shaft has been sunk?
A. About 15 or 20 feet.
Q. Do you know who sunk the Iron shaft?
A. No, sir.
Q. Was it sunk upon that seam of ore?
A. It was.
Q. Somebody prospecting down that seam of ore, sunk the shaft, did they?
A. I presume so.
Q. What kind of ore was there?
A. Galena.
Q. Did you see it there?
A. I did.
Q. And in place?
A. And in place.
Q. What, if any, underground works have been run from the Champion croppings?
A. The Champion tunnel; marked Champion tunnel on the map.
Q. Point it out to the court.
A. There are two branches to the tunnel; one surveyed there, and another there [showing]; and both issuing there at the Shaw winze.
Q. In what does the tunnel commence?
A. In the open cut, or surface ore-chamber.
Q. Through what does it pass?
A. Limestone.
Q. Does it reach any ore?
A. It does.
Q. At what point?
A. At the point marked ore-chamber upon the map.
75 Q. What is the color of that ore-chamber?
A. Red.
Q. Does that correctly represent the size of the ore-chamber?
A. As near as I can represent from my surveys at that time.
Q. Did the ore of that chamber extend to the top of Shaw winze?
A. It did.
Q. Which is at the letter "W."
A. Yes, sir.

Q. What is the depth of the Shaw winze?

A. 67 feet.

Q. Through what does it pass?

A. Through ore.

Q. At that depth what workings did you find at the bottom of the Shaw winze?

A. An ore-chamber, and a drift which runs to the top of the winze, which connected with the Lacita tunnel.

Q. What color represents that ore-chamber?

A. Green.

Q. Does that correctly represent the size and extent of that ore-chamber?

A. Approximately. I would like to state that the ore-chambers are, a great many of them, filled up, and it was impossible to survey them exactly; but I have represented them as near as I could from my surveys at the time, and from my old surveys.

Q. Through what does that drift pass from the bottom of the Shaw winze, after leaving the ore-chamber, to the top of the winze?

A. Low-grade ore and ore stains.

Q. How many of these winzes are there at the point you have marked winzes?

76 A. Four.

Q. What is their depth?

A. They extend about 170 feet in depth.

Q. Through what do they pass?

A. They pass through low-grade ore, and ore stains, to within a point 35 feet from the level of the Lacita tunnel; thence a limestone.

Q. That 35 feet at the bottom, and above Lacita tunnel, is in limestone?

A. It is.

Q. What represents the Lacita tunnel on that map?

A. The Lacita tunnel is colored in brown, and marked "Lacita Tunnel."

Q. Where is the mouth of that tunnel?

A. At this point [showing] on the Richmond side of the hill, near the Richmond shaft.

Q. What ore-chamber is that represented at the letter "W?"

A. An ore-chamber in the Richmond ground, near the Shaw winze?

Q. How far is it from the Shaw winze?

A. It connects with the Shaw winze.

Q. Is it on a level with the other ore-chamber, that the Champion tunnel reaches, near that point?

A. It is lower than that ore-chamber.

Q. How much lower?

A. It extends from that ore-chamber, about 30 or 40 feet lower, I should think.

Q. Does that color correctly represent the size of that ore-chamber as surveyed by you?

A. It does.

Q. In the ore-chamber reached in the Champion tunnel, what is the heighth of that chamber?

77 A. It extends approximately 30 or 40 feet above the level of the Champion tunnel.

Q. Does it extend below the level of the Champion tunnel?

A. In a few places.

Q. On what does that body of ore rest?

A. Limestone.

Q. What does the body of ore at "W," marked "ore-chamber," rest in?

A. Limestone.

Q. What is the Lacita tunnel in?

A. In limestone, ore stains, and ore-chambers.

Q. Commencing from the bottom of those winzes, and going towards the mouth of the tunnel, through what do you pass?

A. The first 61 feet through barren limestone; then the sides of the tunnel show low-grade ore and ore stains; from L J to L H, and from L H, the tunnel passes through barren limestone to the ore-chamber.

Q. How is the ore-chamber marked there?

A. It is marked "ore chamber" on the map; then, through ore stains to the point L D. The balance of the tunnel is barren limestone, except at the points L C, L B, and L A.

Q. What do you find at those points?

A. Low-grade ore and ore stains.

Q. What do you call ore stains?

A. Decomposed limestone containing iron; that will assay some silver.

Q. Point out upon the map the Windsail shaft. Upon what claim is that?

A. The Buckeye.

Q. What is the depth of that shaft?

78 A. About 200 feet. The bottom of the shaft has been filled in.

Q. In what kind of rock is that shaft?

A. Limestone.

Q. Are there any drifts or levels from that shaft?

A. There are.

Q. What distance is the first from the top?

A. The first is marked "first level," and is about 80 feet from the top.

Q. What is it colored?

A. In green.

Q. What is its general direction from the shaft?

A. East and west.

Q. Through what does it pass, leaving the shaft?

A. Leaving the shaft going west it passes through low-grade ore to the point "1 L;" then through barren limestone to the point of "1 G;" then through ore stains to the point "1 H;" then barren to the point "1 J." Going to the east the drift passes through a low grade ore, and ore stains, and ore-chambers to the point marked "1 A;" then in barren limestone to the end.

Q. Is there any level or drift from that shaft?

A. There are two levels. The second level, which is colored in blue; the third level, which is colored in yellow.

Q. Through what does the second level pass?

A. The second level passes through barren limestone, except at points "2 B," "2 D," "2 C," and "2 E."

Q. Except those points?

A. Yes, sir.

Q. What is there at those points?

A. Low-grade ore and ore stains.

Q. Describe the third level.

79 A. The third level is colored in yellow, and marked 3d level. The level passes through barren limestone, except at the points on the map marked by the sign of ore stain, which is a red mark on each side of the level.

Q. Is there any other mark at the point where these ore stains are?

A. There are letters "3 B" and "3 C."

Q. Do the red lines at those points along the line of that level represent the ore stains where you found them?

A. They do.

Q. Is there any other level from that shaft?

A. There is a lower level, and it is in quartzite; but it has been filled up a number of years ago, so that I have not examined it, and I have not represented that on the map.

Q. Was there any ore worked and brought out of the Windsail shaft?

A. Yes, sir; from the ore-chambers as marked upon the map.

Q. From which level?

A. From the first, second, and third levels, and some intermediate levels.

Q. In what colors are those ore-chambers?

A. The colors are of the respective levels.

Q. Of the first level the color is what?

A. Green.

Q. Where are the ore-chambers worked from the first level?

A. They are those ore-chambers marked with green, connected with the first level drifts.

Q. What ore-chambers are worked from the second level?

80 A. One ore-chamber, colored in blue, the color of the level.

Q. Only one ore-chamber?
A. Only one ore-chamber.
Q. Connected with the second level and marked in blue?
A. Yes, sir.
Q. What is the third level work?
A. The third level ore-chambers are marked in yellow, and connected with the third level.
Q. They are the same color as the level?
A. Yes, sir.
Q. Where is the Lawton shaft?
[The witness shows on the map.]
Q. What is the Lawton shaft?
A. It is a perpendicular shaft in limestone, and the bottom quartzite.
Q. In what company?
A. The Eureka.
Q. Is it their main working shaft at the present time?
A. Yes, sir.
Q. In what rock does it start?
A. In limestone.
Q. What is the depth to the first level?
A. 74 feet.
Q. Have you the first level marked upon the map?
A. The first level is marked upon the map in brown and marked "Lawton Tunnel." It commences at the surface, and is connected with Lawton shaft by the drift "1 A;" then also connected with the Buckeye shaft, marked "Buckeye Shaft."
Q. That originally was a tunnel, was it?
A. It was.
81 Q. And then it was connected by that drift "1 A" with the Lawton shaft.
A. It was.
Q. Through what does that level pass?
A. It passes through limestone, except at the points marked upon the map as ore and ore stains.
Q. How are those points marked?
A. They are marked with a red line drawn on each side of the drift.
Q. Name and describe the drifts of that level which are worked.
A. The south branch of the tunnel is in ore stains "1 C" to the cross-cuts "1 D" and "1 E;" then barren to the point "1 L." Ore stains and ore are found at the winze "1 D." The cross-cut "1 H," to the south of Lawton tunnel, is in ore stains. The drift, or the cross-cut to the north "1 K," is in ore stains; and is connected at its northern end with "K." The cross-cut to the south, "1 L," is in ore stains. The cross-cut "1 M" is in ore stains as represented, for a portion of the cross-cut; and the quartzite is intersected at the point shown upon the map "1 M." From the

Buckeye shaft to the end of the Lawton tunnel, there are ore stains the entire distance.

Q. What are the dimensions of the cave you mentioned?

A. It is a large cave. I could not get into the cave to measure it. It is approximately about fifty feet square.

Q. A natural cave?

A. A natural cave.

Q. What is the distance from the first level in the Lawton shaft to the second level?

A. Ninety-six feet.

Q. In what color is the second level marked?

82 A. In light brown.

Q. Through what does it pass?

A. The south branch of the second level passes through ore stains, and an ore-chamber, to the turn. The turn of this south branch is in limestone, except in the point marked "2 M." The main branch of the tunnel runs through ore strains and ore-chambers to the cross-cut "2 A." The cross-cut "2 A," is in ore stains for the distance of fifty-seven feet. It is then barren to the cross-cut "2 A." The cross-cut "2 C" is in ore stains to a point where the drift is filled. The cross-cut "2 D," is in ore stains and intersects the quartzite wall at the point "2 F." The next north branch of the second level, at the point "2 G," enters a small ore-chamber. The main second level has a cross-cut, "2 J," at the northwestern end of the level; in the ends of this cross-cut, at the point "2 D," and "2 L," ore stains are found.

Q. The workings on the second level, then, only reach the quartzite at one point?

A. Only at the point marked on the map "2 F."

Q. What does the black line at "2 F" represent?

A. The quartzite wall.

Q. What is the distance down to the third level of the shaft?

A. 221 feet from the surface.

Q. Describe that level.

A. The third level is colored in red.

Q. Through what does it pass.

A. Starting from the shaft with the southern branch of the third level it is run in barren limestone to the ore-chamber marked "ore-chamber third level." The northwestern branch of the third level is run through limestone from the cross-cut "3 L" to the

83 quartzite wall, with the exception of the point marked "3 K." There is a little branch connecting the southern and northwestern branch of the tunnel marked "3 L" on the map. At the point "3 L" the ore stains commence, which continue to the foot wall. The third level is run on or near the foot wall from the point "3 C" in the ore chamber to the point "3 I'," with ore stains and low gravel ore, as marked upon the map.

Q. To what point?

A. To the point "3 M."

Q. What mark there represents the ore and the ore stains?

A. A red line on each side of the level.

Q. Is the size of that ore-body from the third level and connected with it correctly represented there?

A. Yes, sir; as near as I could get it from my old surveys. The chamber has caved now and I could not get at it.

Q. In what is that ore-body?

A. That ore-body rests upon the quartzite wall, and is in limestone.

Q. Can you tell to what extent it rests upon the quartzite foot-wall?

A. Its entire length; about 150 feet.

Q. And for what height or distance up and down the dip?

A. 100 feet on the dip.

Q. Now, at what points on that level do you say the third level reached the quartzite foot-wall outside of that ore-body?

A. At the point "3 C" it reaches the foot wall, and follows along the foot wall to the point "3 M."

Q. And for that distance you found ore and ore stains?

84 A. I found ore and ore stains the entire distance, with ore grade from "3 H" to "3 F."

Q. What is the depth below the surface of the fourth level of the Lawton shaft?

A. 301 feet.

Q. In what color is that represented?

A. It is colored in green.

Q. Describe through what it passes from the shaft.

A. From the shaft to "4 A" it passes through barren limestone. The drift "4 A" is run through the quartzite wall. It runs through the little bend of the quartzite wall. And that ore and ore stains in the drift except where the drift is entirely in quartzite. The drift enters the ore-chambers marked in green upon the map, and marked "ore-chambers, fourth level." The main branch of the fourth level runs through limestone to the winze marked "winze up" on the fourth level. It intersects the quartzite at the point "4 F." Near the point "4 F" the drift is filled. I did not examine it at this time. The drift runs on the quartzite wall to the foot of the drift.

Q. Have you or not examined it now; and can you state whether there is ore, and ore stains there or not?

A. No, sir.

Q. Does the green ore-chamber correctly represent the size of the ore-chamber?

A. As near as I could get it from my old surveys.

Q. In what rock is that chamber of ore?

A. It is in limestone, and touches the quartzite at the point "4 C" where the foot wall is marked.

Q. For what extent does it touch the foot wall?

A. For about 20 feet.

85 Q. Where that fourth level passes through the contact into the quartzite, is there any mark to represent the quartzite?

A. There is.

Q. At every point through which it passes?

A. Yes, sir.

Q. What is that mark?

A. A black line.

Q. That black line represents where the drift enters the quartzite and where it comes out of it, does it?

A. Yes, sir. That black line represents the line of the contact.

Q. What is the distance of the fifth level from the surface?

A. 380 feet.

Q. In what color is that?

A. In blue.

Q. Describe that from the shaft.

A. Starting from the shaft, the fifth level runs through ore stains from the shaft to its intersection with the quartzite wall to the point "5 B;" from the point "5 B" the level is driven through the limestone, and on the contact of the quartzite wall for a distance of 170 feet; then through ore stains to the first cross-cut. The ore stains extend from this cross-cut to the point "5 D," with the exception of twenty feet at the cross-cut. From the point "5 D" to the point near "5 L" the drift is in limestone, on the contact. From that point to the end of the drift is ore stains and good ore to the end of the drift at the point "5 G."

Q. When you say it is in the limestone, and at the contact, you mean that it runs along by the line of contact between the limestone and the quartzite?

A. I do.

86 Q. What are the dimensions of that body of ore found at the west end of the fifth level?

A. About 70 feet long—70 feet along the level; extending above the level about 70 feet.

Q. To what extent above the level does it go?

A. About 70 feet.

Q. In what is that body of ore?

A. That body of ore is in limestone, but rests upon the quartzite wall.

Q. For what extent along the level is it on the quartzite?

A. 70 feet.

Q. But above the level it is on the quartzite 70 feet?

A. The ore-chamber does not rest upon the quartzite all of the way along; about 40 feet above the level on the quartzite.

Q. What is the depth from the surface of the sixth level?

A. 430 feet.

Q. What is that colored?

A. In brown.

Q. Through what does it pass?

A. Through the shaft for the first 30 feet; the drift is closely cribbed, so that the examination of it is not possible; from that point to the cross-cut "6 A" the drift is run on the contact and ore stains on the contact.

Q. To what point?

A. To the cross-cut.

Q. What is the cross-cut marked?

A. "6 A." At this point the drift is barren, and in the limestone for 15 feet; then it runs along the contact for 30 feet,
87 with ore stains on the contact. The balance of the drift is barren, except at the point marked "6 C," where there are ore stains. At the point marked "6 E" is a raise that connects with the fourth and fifth levels. The drift is filled beyond this winze now, so that we could not examine is.

Q. Have you marked it down upon the map beyond the winze?

A. Yes, sir; from my old survey. It follows the quartzite wall for a short distance, but I don't know whether it is through ore or not.

Q. What is the depth below the surface, of the seventh level?

A. 530 feet.

Q. How is it colored?

A. In orange.

Q. Describe it and through what it passes.

A. Starting from the shaft, this level at that point is in quartzite.

Q. Has the shaft now got down to the quartzite?

A. The shaft is now down between the 6th and 7th levels.

Q. It cuts through the quartzite which is dipped under the shaft?

A. Yes, sir. At the point "7 A" it leaves the quartzite; and at that point ore stains and ore is found. At the point "7 R" the drift enters ore stains and the drift continues in ore stains, running through the seventh level ore-chamber to the point marked "7 G." From "7 G" the drift is extended to a point marked "7 J." At that point ore stains are found extending to "7 H." From this point the drift is barren to the point marked "7 L." And the ore stains and ore is found from the point "7 L" to the end of the level, except where the level is run through the quartzite, except for a distance of about twenty-eight feet, as represented on the map.

88 Q. Between what two points is that twenty-eight feet?

A. The break is shown upon the map; but this is not lettered.

Q. The ore and ore stains are not marked along the level?

A. No, sir. They are not marked along through that space.

Q. Does that correctly represent the seventh level ore-body?

A. As near as I could get it from my old surveys. That ore-body caved and filled in entirely, so that it was impossible to enter it at any point.

Q. In what rock was that ore-body?

A. That ore-body was in limestone.

Q. Does it touch the quartzite?

A. I see no point where it touches the quartzite that I can remember at present.

Q. What is the distance of the 8th level from the surface; the Lawton shaft?

A. 630 feet from the surface, and it is colored in yellow.

Q. Describe that.

A. It commences on the quartzite and passes through the quartzite and into the limestone; and again the main level passes into the quartzite at the point "A B," and leaves it at the point "A C." Here is an ore-chamber marked "ore-chamber," and colored yellow, the color of the level. The main level, continuous from the point "A D" to the point "A E" and "A L," through barren limestone. At the point "A F," low-grade ore is found; also ore stains at the point "A M." At the point "A J" ore stains commence, which continue to the end of the level.

Q. In what is that ore-body which is found on the 8th level?

89 A. That is in limestone.

Q. Does it touch the quartzite?

A. It does not.

Q. Are its dimensions correctly represented on the map?

A. Yes, sir; they are.

Q. What is the distance between the 9th level and the point of the shaft?

A. The 9th level is 730 feet from the top of the shaft; and is colored in purple.

Q. Describe through what it passes?

A. The 9th level is driven through quartzite to the point "9 A," at which point it strikes the contact. From "9 A" to "9 S," the level is driven through limestone. At the point "9 S," it again enters the quartzite, and continues in quartzite to the point "9 T." The quartzite is also found in the drift marked "Skylark drift." At the point marked "9 G," the 9th level continues through limestone to the cross-drifts "9 A" and "9 L," and at that point ore stains and low-grade ore are found, as shown upon the map. Ore stains are also found at "9 M." At "9 N" ore stains and low-grade ore are found, which continue on to the end of the level at "9 R."

Q. Ore stains and low-grade ore?

A. Ore stains and high-grade ore; ore stains and ore. The cross-drift "9 E" of the 9th level intersects the foot wall or quartzite at the point "9 F;" also in the drift "9 E." In the cross-drift "9 H." ore stains are found, which continue to near the hanging wall of the ledge at "9 L." The ore stains are found there within 24 feet of the hanging wall.

Q. Is that the first time you have reached the hanging wall in these underground workings of this mine?

90 A. Yes, sir. That we reach in the 8½ level. I have not described that level yet.

Q. Go ahead with that, then.

A. A cave has been opened from the 9th level at the point marked "K" on the map; a natural cave.

Q. Do those lines enclosing the word "cave" represent approximately or accurately the size of the cave?

A. They do.

Q. What are about the dimensions of that cave?

A. About 100 feet in length, by 60 feet in breadth; and about 40 feet in height.

Q. In giving that statement of its height, you measured at a right angle to the floor of it?

A. Yes, sir; that is, the part of the cave which extends up to the extreme top is longer than I have given.

Q. What is that body of ore at the end of the 9th level in?

A. It is in limestone, and rests upon quartzite.

Q. For what extent below the level has that ore been followed?

A. 160 feet.

Q. In what?

A. In limestone.

Q. By a winze?

A. Yes, sir; by winzes marked "9 W" and "9 T."

Q. It has been followed down 160 feet below the 9th level?

A. Yes, sir.

Q. Are both winzes all of the way in ore?

A. Yes, sir.

Q. How far apart are the two winzes?

A. 30 feet.

Q. Do those winzes touch the quartz anywhere?

91 A. The winze 9 T touches the quartzite.

Q. Does it go down on the contact?

A. It goes down on a portion of the contact.

Q. And then how does it go the rest of the way?

A. Through ore.

Q. Describe them particularly. Commence at the level and describe each winze; and what it extends in.

A. There is an ore of chamber and ore stoopes on the 9th level, and the winze 9 W starts down in the ore stoopes, and it goes down 30 feet in the ore stoopes; then following along the ore stoopes to the winze 9 T. The winze 9 T is sunk down through ore until it strikes the quartzite wall.

A. In what distance?

A. For about 70 feet, until it gets to the quartzite wall; then it follows down across the wall, which is perpendicular at that point, and then on an incline of about 45 degrees on the quartzite wall to the bottom.

Q. And is there ore all of the way down that winze?

A. There is ore all of the way down that winze.

Q. The bottom of that is 160 feet from the 9th level?

A. Yes, sir.

Q. Then you can say that that body of ore extends down from the 9th level, 160 feet?

A. Yes, sir.

Q. And rests for that distance upon the quartzite?

A. Yes, sir.

Q. So far as it is exposed thereby the workings of the Eureka, for what length, from east to west, does it rest upon the quartzite?

A. For 55 feet.

Q. Passing beyond that ore-body on the 9th level, through what does the drift pass?

92 A. The 9th level I have described to the end.

Q. What is there at the end of it?

A. Ore.

Q. And what does it come against, or to?

A. It comes to the winze that is opened into the Richmond ground.

Q. It comes to the top of the winze, does it?

A. Yes, sir.

Q. What is the depth of that winze that opens into the Richmond ground?

A. 29 feet.

Q. After going down that winze the 29 feet, where do you pass on to the Richmond, and how?

A. You pass into the drift marked "35 feet above the 6th level;" that is, the 6th level of the Richmond mine; then following that drift, it opens into the Potts chamber.

Q. You say, passing along the level, you come to the top of the winze that leads down to the Richmond works, and the depth of that winze is how many feet?

A. Twenty-nine feet, I think.

Q. That brings you to the level marked what?

A. Marked "thirty-five feet above 6th level."

Q. Then you pursue that into the Potts chamber?

A. Yes, sir.

Q. Up to what point did the Richmond company work there?

A. To the top of that raise there, or winze.

Q. Is it at the top of that winze that the break-through occurs from working into the other?

A. Yes, sir.

Q. From that ore-body on the 9th level, around into the Potts chamber, is there any ore, ore stains, or tracing?

93 A. Ore stains and ore all of the way into the Potts chamber.

Q. Now describe the 10th level of the Eureka Mining Company.

A. The 10th level of the Eureka mine is opened through the

winze 9 V, of the 9th level; from the point 9 V, at the bottom of the winze, the level is driven back to the point 10 A, at which the foot wall or quartzite is found. At the point 10 D, the level enters ore stains which continue to near the hanging wall.

Q. How many feet from the hanging wall?

A. Within six feet of the hanging wall. The draft then follows along or near the contact of the hanging wall to the point 10 E. The drift of the 10th level, marked 10 F, is connected with the workings of the Richmond company.

Q. At what point?

A. It is not lettered. It is merely shown where the connection is made; there are ore stains and ore the entire length of this level from 10 B to its connection with the Richmond mine, with the exception of the space at 10 E, where the ore spots are about eight or ten feet apart, for the distance of twenty-four feet; the balance is through ore stain continuously.

Q. Mark the point of connection with the Richmond, with some letter, in pencil.

[Witness marks 10 G.]

Q. The 10th level does not connect with the Lawton shaft?

A. It does not.

Q. You say that the hanging wall, which is exposed in the 10th level, is also exposed in the 8½ level?

A. Yes, sir.

Q. Describe that 8½ level.

94 A. 8½ level is 30 feet above the 9th level, is open through the winze 8S. For the first 135 feet of the 8½ level, to the point 8½ B, the drift is through ore stains and ore-chambers. At the northeastern end of the 8½ level, to the point marked "8½ A" on the map, the hanging wall has been found with ore near the hanging wall.

Q. How near?

A. Within two feet of the hanging wall.

Q. What is the extent of the ore at that point?

A. 11 feet in length.

Q. What kind of ore is it?

A. Very low-grade ore; very low-grade ore stains.

Q. Are you familiar with the ore of that lode?

A. I am.

Q. How is the hanging wall marked at that point, on the 10th level?

A. It is marked with a blue line.

Q. Does that line, at each point where the hanging wall is exposed, indicate the length for which it is exposed?

A. It does; and where not exposed it is marked with a dotted line, except on the 10th level; and this is marked in a full line for the entire length from 10 C to 10 E. But it has been exposed the entire distance, except a few feet.

Q. Under the words "hanging wall" on the map?

A. Yes, sir.

Q. Now, in the 10th level, running along the hanging wall, what kind of ore did you find there?

A. I found good ore, in spots.

Q. Did you find any galena?

A. Yes, sir; in one or two places; and occasional spots of good ore.

Q. No continuous body of ore along there?

A. No, sir; no continuous bodies of ore?

95 Q. And there is only the drift running along the hanging wall?

A. That is all.

Q. From the ore-body that you have described at the west end of the 5th level, what workings extend downwards?

A. From the ore-body at the west end of the 5th level the winze 5 R connects with the intermediate 6th level at the point 6 H. From the point 6 H, of the intermediate 6th level, the level continues to 6 J. At that point a winze has been sunk connecting with the 7th level at the point on the map marked "7 T."

Q. Through what do those winzes pass?

A. Ore.

Q. What kind of ore?

A. Very good high-grade ore.

Q. In what quantity?

A. The winzes are sunk in the quartzite wall, and all around the winzes, the sides and tops, is good ore, very fine ore, resting upon the quartzite wall.

Q. What is the thickness of the ore there, as far as exposed by those winzes, along upon the quartzite wall?

A. From 3 to 4 feet.

Q. Now, what distance is that from the 5th level down to the 7th level?

A. Horizontally 180 feet.

Q. It would be along the top of the quartzite, along which the winze passed?

A. Yes, sir.

Q. And they show that for that distance downwards, from the 5th level, there is a body of ore resting upon the quartzite, from 2 to 3 feet in thickness. How much thicker, or how much in extent, on either side of these winzes, it is not known?

96 A. No, sir.

Q. It has not been explored yet?

A. No, sir.

Q. From the 7th level downwards, what workings are there?

A. From the 7th level, which is reached at this point, 7 T, a drift from 7 N to 7 H has been reached, connected with the cave winze.

Q. What is that?

A. The winze that raises from the large cave that is at the northwestern end of the 9th level. From the point 7 T to 7 S, ore and ore stains are continuous, except for a point of about 28 feet. The break is shown upon the map. Continuing down the cave winze to the 8th level from the point 7 S to 8 J, ore stains are found down the entire length of the winze to the cave, or to the 8th level. From the point 8 J, the 8th level has been driven out; and at the point 8 K, a winze has been sunk, connecting with the 9th level cave. There are ore stains from the point 8 J and 8 K, and down the cave winze into the cave. Down the winze 8 K, the ore stains are continuous, with good ore in spots, to the cave on the 9th level, and around the sides of the cave, to the winze marked on map "Cave Winze No. 2." From that point there is good ore down into the ore-body found at the northwest end of the 9th level.

Q. From the 7th level down to the ore-body at the west end of the 9th level that you have described, is there a continuous ore-tracing or not?

A. There is a continuous body of ore; in some places very low-grade, but ore all ot the way.

Q. You stated that at one place there, in passing along the level there was a breach?

97 A. Yes, sir; from the 7th level down to the cave. This breach is on the 7th level. But, before I leave the 7th level to go down from the 7th level to the ore-body on the 9th level, there is a continuous tracing of low-grade ore.

Q. On the 7th level from the point where that tracing commences, to the bottom of the tracing from the 5th level, there is a breach in the continuity of the tracing?

A. Yes, sir.

Q. For what distance?

A. About 28 feet.

Q. Is that 28 feet along the quartzite contact?

A. No, sir.

Q. When you were last there, was there any other works going on, to connect the ore-bodies at that point?

A. The drift was being run to connect the point 7 T and the point 7 S. That drift was being run on the quartzite wall; and as far as the drift had been run, there were ore stains the entire distance.

Q. How far had it been run; and how far did it have to go to reach the point of beginning?

A. When I examined it there were but 20 feet to go to the point 7 S.

Q. Where they were finding low-grade ore again?

A. Yes, sir.

Q. So that there was a connection along that level again, except that distance of 20 feet?

A. Yes, sir.

Q. That is on the 7th level?

A. The original drift of the 7th level ran out into limestone, where there was a breach of the continuity of this ore.

Q. But the drift that was being run when you were last
98 there, from the same point, 7 T to 7 S, along the quartzite, had grade ore to within 20 feet of 7 S?

A. Yes, sir.

Q. Is it your opinion that the ore will continue to this point 7 S?

A. I think it will.

Q. How many feet, then, horizontally, from the 5th level ore-body to the 9th level ore-body, is there ore on the quartzite? Give it vertically first.

A. 500 feet vertically.

Q. It would be more along the dip of the quartzite?

A. It would.

Q. Now, then, at the widest point horizontally, how long is that body of ore upon the quartzite, at different places? Name them and name the places.

A. From the point 5 G on the 5th level to the point 10 B on the 10th level is a distance of 480 feet horizontally.

Q. In passing west on the 9th level into the Richmond works, do you know where there is a point marked on the map of the defendants, 69 B?

A. I think I do.

Q. Mark it on this map as 69 B.

[Witness marks it.]

Q. At the point *now* marked upon your map, 69 B, what did you find?

A. Ore stains.

Q. Upon what?

A. Upon the quartzite wall.

Q. Have you been through the workings of the Richmond company?

A. I have.

Q. Where do they commence on the surface, on the south side of the hill?

A. At the Tip-Top incline.

99 Q. Now describe those workings, commencing at the surface, and going down.

A. The Tip-Top incline commences at the surface of the ground, and from a drift, at the bottom of the Tip-Top incline, we enter the ground marked "Cave," and the ore-chamber on the level of the Lacita tunnel, and running up above the Lacita tunnel. From the Lacita tunnel the Rossiter incline runs down and connects with the first level of the Richmond, marked in brown.

Q. Is the Rossiter incline marked upon the map?

A. Yes, sir.

Q. You have written the letters "Rossiter incline" there?

A. Yes, sir. From the first level a winze (2 A) connects with the second level of the Richmond. A winze marked 2 D connects the second level of the Richmond with the third level. The fourth level of the Richmond can be entered through a shaft, or by winzes down from the third level at 3 C, through 3½ A. The fourth level is colored in yellow.

Q. Have you marked between the top of the Rossiter incline and the third level all the chambers of ore that have been worked out in the Richmond workings?

A. I have not.

Q. Why?

A. Because I could not get at them to measure them, as they are caved.

Q. There are old chambers there, then, between the "Rossiter incline," the head of it, and the third level, which you did not put down upon the map, or survey, and cannot describe?

A. Yes, sir.

Q. Where is the Richmond working shaft?

A. At the point marked "Richmond shaft."

Q. In what formation is the top of the shaft?

100 A. I have never examined the top. It goes down, I think, through limestone into slate, and then through the slate again through the limestone. I am not positive whether the top of the shaft is in limestone or not.

Q. Does it pass through the vein limestone again with quartzite?

A. Yes, sir.

Q. What is the depth from the surface to the first level of the Richmond?

A. The first level of the Richmond is not connected with the shaft, except through the winze "2 A."

Q. What is the depth of the second level?

A. The levels of the Richmond, I have been informed, are: the 2d one, 200 feet; the 4th, 400; 5th, 500; 6th, 600; 7th, 700; 8th, 800; 9th, 900.

Q. One hundred feet apart?

A. Yes, sir; I have been so informed.

Q. You have traveled up and down the shaft frequently, and up and down through the workings?

A. Yes, sir.

Q. Is that statement apparently correct?

A. It is.

Q. Which is the first level, then, that connects with the Richmond shaft?

A. The 2d level.

Q. What is it colored?

A. Brown.

Q. Through what does it pass?

A. It passes through the shale—the shale hanging wall—into the

limestone, and continues in the limestone for its entire length; it is marked "2d level."

Q. What is the 3d level colored?

101 A. The third level is not connected with the shaft and is colored brown.

Q. It is reached with the winze from the 2d level?

A. Yes, sir.

Q. Does the 4th level connect with the shaft?

A. Yes, sir; and is colored yellow, and marked "4th level."

Q. Through what does it pass?

A. Through limestone.

Q. All of the way?

A. All of the way, except at the points "4 E" and "4 F," and from "4 B" to "4 C," where ore stains are found.

Q. Does it reach any body of ore?

A. It reaches a body of ore at "4 F" and at "4 D," small bodies of ore.

Q. Have you worked upon the map those small bodies of ore in the same color as the level?

A. Yes, sir.

Q. Does your sketch of them represent the size of those ore-bodies?

A. As near as I could obtain them at the time.

Q. In what are those ore-bodies?

A. In limestone.

Q. Not connected, as far as you saw, with the quartzite?

A. No, sir.

Q. What is the fifth level marked?

A. Fifth level, probably.

Q. It is the same color, probably, and marked "fifth level?"

A. Yes, sir.

Q. Describe that and what it passes through.

102 A. The 5th level passes through limestone from the shaft to its connection with the Potts chamber. The northwestern branch of the fifth level passes through limestone, except at the points "5 B," "5 A," and "5 C," where it passes through ore stains and low-grade ore.

Q. What extent of low-grade ore is there at either of those points, and at which one?

A. The cross-drift "5 B" is 15 feet in length, in low-grade ore, the entire distance; cross-drift "5 A" is 63 feet in length, in low-grade ore and ore stains, the entire distance. At the point "5 C" the ore stains are 45 feet in length.

Q. Between those cross-drifts and the shaft there, what does the drift pass?

A. Limestone.

Q. Limestone without any traces of ore?

A. Yes, sir.

Q. Have you followed out the 5th level to the end on the other side of the shaft, extending to the east?

A. I have.

Q. You have completed the description of it?

A. Yes, sir.

Q. What is the color of the 6th level?

A. Red, and it is marked "6th level."

Q. Describe through what that passes?

A. That passes through limestone, and there is an ore-chamber found at that point marked "ore chamber, 6th level." In the right-hand branch of the 6th level there is a rise through the ore stopes in the level I mentioned before, marked "35 feet above 6th level, which is connected with the Eureka 9th level." The left-hand branch of the 6th level enters the ore-chamber marked "ore chamber, 6th level." It intersects the hanging wall at the point marked "6 F," also at "6 G" and "6 H." At the point marked
103 "6 J" a winze has been sunk connecting the 6th level and the 7th level of the Richmond mine. And from these winzes a drift has been run connecting with the 10th level of the Eureka Consolidated.

Q. At what point?

A. At the point "10 G."

Q. Now describe the next level.

A. The 7th level of the Richmond is colored in green. Between the 6th and 7th levels of the Richmond company the quartzite wall has been struck in the shaft.

Q. And it has passed through the vein limestone and come down into the quartzite?

A. Yes, sir. Leaving the quartzite, the right-hand branch of the 7th level, which leaves the 7th level at the point "7 A," again intersects the quartzite wall at the point "7 B;" also at the point "4 D" and "7 D." The left-hand branch of the 7th level, at the point "7 E," enters the ore stains, and there is an ore-chamber at the next right-hand branch. The second right-hand branch, at the 7th level, intersects the hanging wall at the point "7 F," and runs in the hanging wall to the point marked "7 J." From "7 J" to the end of the level the level has been driven along the hanging wall.

Q. And what is there along the hanging wall there?

A. There is ore.

Q. For what length is it driven along the hanging wall at that point?

A. For 25 feet beyond "7 J."

Q. How does the ore lay, with reference to the hanging wall there?

A. The ore lays almost upon the hanging wall.

Q. What is the extent of the ore there, if you remember?

104 A. 35 feet in length; and in thickness varying from two or three inches to a foot and over.

Q. What kind of ore is it?

A. I haven't examined it well enough to state whether it is good ore or not. This ore I don't know whether it is high or low grade. I cannot tell from the examination I made.

Q. Describe the other part of your level.

A. The branch of the 7th level at "7 G" again intersects the hanging wall, and is run on the hanging wall of the ledge from the point "7 G" to the point "7 H." The main 7th level has been continued from the point "7 G" to "8 E," and at "8 E" a heavy body of shale has been found.

Q. Describe the 8th level; its color and what it is marked.

A. The 8th level is colored in blue. The shaft at the 8th level is in quartzite. It leaves the quarzite at the point 8 A, and there is a cross-drift at the point 8 A that has been driven on the quartzite wall, or on the contact. On the point 8 B, a winze has been sunk which connects the winze 9 D and the 9th level. On the 8th level, at 8 D, a cross-cut has been run on the hanging wall of the ledge for 30 feet.

Q. Have you ever examined or surveyed the 9th level of the Richmond?

A. Yes, sir. The 9th level of the Richmond is colored in orange and is marked "9th level." At the point 9 A, the 9th level leaves the quartzite, and is run from that point to the end of the limestone. The drift 9 B of the 9th level again intersects the quartzite. The drift 9 C connects with the winze that runs down from the 8th level.

Q. Is the quartzite in all of these points marked with a black line?

165 A. Yes, sir.

Q. And in every point where any of those workings touch the shale hanging wall, it is marked with a blue line?

A. Yes, sir.

Q. Do those black and blue lines represent the courses and distances for which those workings expose those foot and hanging walls, correctly?

A. They do.

Q. And where you have dotted the line to represent either one of these lodes, it means that it has not been exposed there, but that is your idea of its course and extent?

A. Yes, sir; it is.

Q. Are you familiar with the workings of the K. K. mine?

A. Yes, sir; I am.

Q. Are there any croppings of this lode on the surface of the K. K?

A. There are at the point marked "Shaft D."

Q. What is the extent of the croppings at that point?

A. The croppings are merely around the top of the shaft; they are not extensive.

Q. In what are they, what rock or formation?

A. In limestone.
Q. Have you ever been down that shaft?
A. I have.
Q. What did you observe in that shaft?
A. I followed down from that shaft to the ore-chamber—
Q. The dip of that shaft is in limestone?
A. Yes, sir.
Q. Describe what you pass through as you go down.
106 A. That is not the main working shaft. I follow down through the ore chambers almost the entire distance into the second level.
Q. The top of it is in limestone?
A. Yes, sir.
Q. Does it ever get out of the limestone?
A. No, sir; it does not.
Q. Does it ever reach the quartzite?
A. It does not.
Q. Does it reach ore?
A. It does.
Q. At what depth from the surface?
A. At the surface the ore commences; and about twenty feet below the surface an ore-chamber is found.
Q. What is the extent of that ore-chamber?
A. I made no survey of that because it was impossible to survey it. I could not get down through there with an instrument.
Q. About how many feet is that ore-chamber?
A. I think about 100 feet in depth along the incline.
Q. You passed down through it, did you?
A. Yes, sir.
Q. Then what did you come to?
A. Then I came to limestone, and into the ore-chamber of the second level of the K. K. mine.
Q. Did these two ore-chambers connect?
A. They did not.
Q. Was there ore between them?
A. No, sir; not all of the way.
Q. You passed them 100 feet in that ore-chamber, and then came to the limestone. Then, how far did you pass in the limestone before you came to the next ore-chamber?
A. I think about 30 feet.
107 Q. When you entered another ore-chamber?
A. Yes, sir; and I passed down through that ore-chamber to the level of the 2d level of the K. K. mine.
Q. And ore has been taken from that chamber?
A. Yes, sir.
Q. You came down, then, to the 2d level of the K. K. mine. What did you find there?

A. Where I enter that level there is a large ore-chamber that has been worked.

Q. Did you pass on down below that?

A. I passed on from that to the third level.

Q. How?

A. By following down through the ore-chambers to the third level.

Q. What did you find in the third level?

A. When I got within 45 feet of third level I found an ore-chamber extending along on the quartzite wall, which is marked on the map, "Ore-chamber, third level."

Q. For what extent is that upon the quartzite wall along the level?

A. It is not along the level; it is above the level, 120 feet from east to west upon the quartzite wall.

Q. For how many feet up and down?

A. It was then stopped so that I could not measure it. But, in places, 20 or 30 feet were open, so that I could see that.

Q. But it must have been a much greater extent upon the quartzite?

A. Yes, sir.

Q. Did you follow that body of ore, or ore-chamber, in any other direction?

A. I could not follow that to its western limit, because
108 the ground had been filled in. The workmen said it extended much farther on the quartzite wall, but I could not follow it any farther. From that ore-chamber I entered the third level by the winze 3 F on the map.

Q. Where is the working shaft of the K. K? Mark it upon the map.

A. At the point marked "K. K. Shaft."

Q. In what is the top of that shaft?

A. In limestone.

Q. How far is it down to the first level?

A. 124 feet.

Q. What is the color of that level?

A. It is colored in orange, and marked "1st level."

Q. Describe through what it passes.

A. Through limestone the entire length of the level. And from this level a large ore-chamber has been worked, which is marked "Ore-chamber, 1st level."

Q. What is that colored?

A. The same color as the level, orange.

Q. And does that drawing or sketch of it correctly represent the dimensions of that ore-chamber?

A. Yes, sir.

Q. What is that ore-chamber in?

A. In limestone.

Q. Does it touch the quartzite?

A. Not at any point that I saw.

Q. What is the distance from the top of the K. K. shaft to the 2d level?

A. 175 feet.

Q. What is the level colored?

A. Yellow, and it is marked 2d level.

Q. Describe through what it passes.

A. That level starts from the shaft in the ore stope; and
109 from the shaft to the point 2 A it is in barren limestone. From the point 2 A to the point 2 F, above the level, is an old ore stope that is now filled in, and I could not survey it. I was informed that it ran along above the level, but I could not examine it so as to make a survey. The drift 2 E enters the ore-chamber of the 2d level; also the drift 2 F. And in the drift running north from the shaft, the hanging wall of the ledge has been opened at the point marked 2 L.

Q. Does that drift pass through the hanging wall, or what?

A. It passes through the hanging wall and into the limestone beyond.

Q. What is the width of the shale at that place?

A. About 2 feet, according to my recollection.

Q. For what distance in the country limestone, beyond and to the north of that, does the drift extend?

A. I have not got that, and I don't remember.

Q. Can you estimate the distance?

A. About 20 feet.

Q. On the inside of the shale, what does the drift pass that cuts through the shale there and runs into country limestone?

A. It passes along a fissure; a smooth surface of lime.

Q. To what extent did you see it?

A. For about 93 feet.

Q. In length along the drift?

A. Yes, sir.

Q. What is its course?

A. Its course is the same as the drift, which is nearly north.

Q. Then its course is nearly north and south?

A. It is.

110 Q. For about 90 feet in length, and it has a smooth face of limestone?

A. Yes, sir.

Q. Did you see how high it extended above the drift?

A. About 20 feet, I think, above the drift I saw in one place. Near the shaft a raise had been run up on it about 20 feet.

Q. Did the face of the limestone extend beyond the shale?

A. It did not. It stopped at the shale.

Q. Where the drift comes up above the shale?

A. Yes, sir.

Q. How is that driven.

A. The dritt has been run through the shale and along the wall up to the shale, and in the course of the wall beyond. And the break has been traced up to the shale and has never been found.

Q. And does not penetrate the shale?

A. No, sir.

Q. Now, the third level of the K. K.—what is it marked?

A. The third level is marked "3d level" on the map, and is colored in red.

Q. Through what does that pass?

A. It begins in limestone, and at the point "3 A" of the 3d level a dritt has been run to the point "3 B." At the point "3 B" the hanging wall has been found, and a winze sunk on the hanging wall. Also from the point "3 A" to "3 B," above the level, an ore-chamber has been found. At the point "3 B," the level again intersects the hanging wall of the ledge, and follows along the hanging wall to near the point "3 D." From the point "3 D" the drift leaves the hanging wall, and runs to the
111 point "3 F." From the point "3 D" to "3 F," the winze runs through low-grade ore and ore stains all of the way from the hanging wall to the foot wall, with the exception of a few feet at the hanging wall.

Q. How many feet at the hanging wall?

A. About 10 feet.

Q. What distance apart are the foot and the hanging wall at that point; at right angles to the wall?

A. 280 feet.

Q. At what depth is that below the surface, approximately?

A. 283 feet below the surface.

Q. For what length at the point is the wall continuously exposed?

A. 150 feet.

Q. And for what extent is it exposed at the other point beyond that to the west of this?

A. About 15 feet, to the point marked "3 B."

Q. Did you observe at "3 B" a winze running down under the hanging wall?

A. I did.

Q. Did you see how deep that winze was; how much of an exposure it made?

A. It was about 15 or 20 feet in depth. I could not get down into the winze.

Q. What appearance did it present, of a hanging wall?

A. The smooth surface of the hanging wall as far as the winze had been sunk.

Q. What is about the dip of the hanging wall along there?

A. About 75 to 80 degrees.

Q. Have you marked out the 4th level of the K. K?

A. The 4th level is marked "4th level," and is colored green.

112 Q. Describe it.

A. Leaving the shaft in the limestone, it continues in limestone the entire distance. At the point 4 E. it intersects the quartzite wall, and follows along the quartzite wall to the winze that connects with the 5th level. At the point 4 M is the ore-chamber that is worked out about, on the 4th level.

Q. What is the ore-chamber in?

A. In limestone.

Q. What is it colored on the map?

A. In green.

Q. Is it marked that in letters?

A. It is marked "4 M" at "4 B." of the 4th level, which connects with the main level by the cross-cut. A drift has been run along the quartzite wall from "4 A" to "4 C."

Q. For what distance?

A. 200 feet.

Q. What is the appearance of the quartzite wall at that point?

A. I could not examine it at this time. It had been filled in. My former survey showed that that level was run along side the quartzite wall. I don't remember the appearance of it.

Q. Describe the next level.

A. The 5th level of the K. K. mine is colored in blue and is marked "5th level." At the point "5 A." the 5th level intersects the foot wall of the ledge and continues along the foot wall of the ledge from the point "5 A" to "5 D." Ore stains are marked on this level from the points "5 G" to the wing at "5 D," but the drift is filled up and I could not examine it very carefully. At points there were ore stains on the level. I have been informed that there was ore along the level for its entire distance after its intersection.

113 Q. Describe the next level.

A. The 6th level of the K. K. mine is colored in orange; and from the point "6 A" to "6 E" a level is run on the contact, with ore stains all of the distance. From "6 E" to the raise marked "6 F" it has been run on the contact, and is barren of ore. The raise from "6 F" to "5 D" is run on the contact, with ore all the entire distance.

Q. How much of a raise is that from the level? What is the length of it?

A. The distance between the two levels is 100 feet.

Q. That connects one level with the other?

A. Yes, sir; a horizontal distance of 130 feet; and there is an ore-chamber marked "ore-chamber, fifth level," which is found between the fifth and sixth levels. The seventh level of the K. K. mine is colored in brown. A shaft between the sixth and seventh levels enters the quartzite. The level leaves the quartz at the point "B 9," and continues along the contact to the end of the level.

Q. Are there ore stains along the line of the contact for that distance?

A. No, sir.

Q. What is the distance between the levels of the K. K. mine at the shaft below the third level?

A. From the third to the fourth, 100 feet; from the fourth to the fifth, 116 feet; from the fifth to the sixth, 100 feet; from the sixth to the seventh, 126 feet.

Q. Lying east of the K. K., what mine is there?

A. There is the Phœnix.

Q. What next east of the Phœnix?

A. The Jackson.

Q. Are you familiar with the workings of the Jackson?

114 A. I am.

Q. How is the Jackson mine worked?

A. The Jackson mine is worked through a perpendicular shaft. And from that perpendicular shaft at the top of 300 and 460 feet, levels have been run which intersect the shaft.

Q. In what is that shaft started?

A. It is started in limestone.

Q. On which side of the contact between the limestone and the quartzite?

A. On the north side.

Q. And extending down 300 feet?

A. 460 feet.

Q. Through what does it extend that distance?

A. Through limestone.

Q. At the bottom you say there is a drift; running in what direction?

A. Running in a southerly direction.

Q. Through what does that drift pass?

A. Through limestone.

Q. What kind of limestone?

A. Stratified limestone.

Q. All of the way?

A. Almost the entire distance.

Q. How far does it pass through stratified limestone, passing from the bottom of the shaft?

A. I have not measured that, and I would not like to state.

Q. Do you reach the lode?

A. We reach a hanging wall at about 300 feet from the shaft.

Q. What is the thickness of the hanging wall there?

A. It is two or three feet.

Q. What is it?

A. A clay shale.

115 Q. Does the drift pass through the clay-shale, going on to the south?

A. Yes, sir.

Q. What does it enter?

A. The ledge, or the limestone.

Q. How far does it pass in that limestone?
A. About 100 feet.
Q. Is that limestone stratified or non-stratified?
A. Non-stratified.
Q. After it passes through that limestone, what does it reach?
A. It reaches the quartzite wall.
Q. Does it extend into the quartzite?
A. Not at that point.
Q. It runs to the quartzite, and stops?
A. Yes, sir.
Q. Is there any drift running into the quartzite there?
A. Yes, sir; in the 300-foot level.
Q. That is 100 feet above?
A. 160 feet above.
Q. What is the distance apart, on that lowest level of the Jackson? Is this shale which you call the hanging wall, and the quartzite which you call the foot wall?
A. At one time they came within a foot or two of each other.
Q. In what direction from this drift that ran directly south from the bottom of the shaft?
A. Towards the west, from that drift.
Q. How close together do they come?
A. Almost together. I think within a foot.
Q. What is lying between them at that point?
A. Limestone and ore.
Q. Is the limestone and ore interlined?
116 A. I don't remember; I think it is low-grade ore at the contact of the two.
Q. From the quartzite to the shale?
A. Yes, sir.
Q. Do you remember?
A. I don't remember very distinctly; but my recollection is that it was low-grade ore, or limestone there near the contact of the two.
Q. Is the same condition of things observable in the upper level, 300 feet down?
A. No, sir; where they come near together is on the 460-feet level.

[Here the court adjourned until to-morrow at 10.30 A. M.]

117 SECOND DAY.

TUESDAY, *July* 24, 1877.

Testimony of THOMAS J. READ continued:

Mr. Thornton.—Q. On yesterday I was asking you about some few workings in the Jackson mine. Is there any tunnel in the Jackson mine?
A. There is.

Q. Where is the mouth of that tunnel; on which side of the lode?

A. On the north side of the lode.

Q. What is the mouth of it in?

A. Stratified limestone.

Q. What is the distance in that tunnel to the shale?

A. About 50 or 60 feet.

Q. Not 50 or 60 feet passed through that kind ofrock?

A. Stratified limestone.

Q. Then, what does it reach?

A. The hanging wall of the ledge.

Q. Does it penetrate that wall?

A. It does.

Q. What is that wall that it penetrates?

A. A clay seam.

Q. What is its thickness at that point?

A. Two feet.

Q. What is the distance below the surface of that point?

A. About thirty feet.

Q. After passing through that two feet of shale what does the tunnel enter?

A. Unstratified limestone.

118 Q. How far does it penetrate that limestone?

A. About 60 feet.

Q. What does it reach then?

A. Then there is a winze going down, which is run into the ore.

Q. What is the depth of the winze from the level of the tunnel?

A. About 30 feet.

Q. It reaches ore at the bottom?

A. Yes, sir.

Q. What is the size of the body of ore?

A. I have never examined it sufficiently to state. The stopings have caved in.

Q. Can you state whether or not it reaches the quartzite?

A. The quartzite I have not found in that part of the works.

Q. What is the whole length of that tunnel?

A. 125 feet.

Q. What is its course from its mouth?

A. About south.

Q. You say you have marked upon this map with black lines wherever in the works of the "K. K.," "Eureka Consolidated," and the "Richmond," a quartzite foot wall is found?

A. Yes, sir.

Q. And with the blue line wherever the shale hanging wall is found?

A. I have.

Q. In your opinion is that shale hanging wall the same, or is it not the same that is found in the Jackson mine?

A. I conclude it is not the same.

119 Q. Is it found or exposed at any point near these works you have described in the Jackson mine and in the K. K. mine?

A. It is not.

Q. Why isn't it exposed in the workings of the Phœnix mine?

A. The workings of the Phœnix mine are all near the foot wall, near the quartzite.

Q. Have not penetrated sufficiently far towards the north?

A. They have not.

Q. In the K. K. mine what was the lowest level that you found that hanging wall upon?

A. On the 3d level.

Q. What is the nearest distance at right angles between the shale hanging wall and the quartzite foot wall where they are both exposed on the 3d level of the K. K?

A. I could not give you the distance at right angles, because the hanging wall has not been run out far enough to the east, nor the foot wall far enough to the west, between them; that is, the angle across the ledge, as the drift has been run, the distance is 209 feet.

Q. It would be a shorter distance at right angles to the hanging wall, would it?

A. It would.

Q. Can you estimate the difference between those walls at any point on the second level of the K. K?

A. I cannot.

Q. Now, in the Eureka Consolidated, at the point farthest west, where the hanging wall is reached, and at the lowest depths of the workings of the mine, state the difference between the hanging wall and the foot wall.

120 A. 205 feet on the 10th level, from "10 A" to "10 C."

Q. Have you marked upon that map the Bell shaft tunnel?

A. I have.

Q. Does the shale hanging wall appear in that Bell shaft tunnel?

A. It does.

Q. How far from the mouth of it?

A. 35 feet.

Q. What is the Bell shaft tunnel marked on the map?

A. "Bell shaft tunnel."

Q. At what distance below the surface is the point where that tunnel cuts the shale, or exposes it?

A. About 20 feet.

Q. Can you give absolutely or approximately the distance between the hanging wall at that point, and on the level of that tunnel, from the quartzite foot wall?

A. 800 feet.

Q. That is at something of an angle across the lode?

A. Yes, sir; a slight angle; not directly across at right angles with the shale hanging wall.

Q. With its dip that course?

A. Yes, sir.

Q. In the lowest working of the Richmond, where you found a shale hanging wall and the quartzite foot wall, can you state the distance and name the points between them?—give the distance between the walls and name the points where you estimate it.

A. On the eighth level, from "8 A" to "8 D," the distance is 230 feet.

Q. That is from one wall to the other wall?

121 A. From the foot wall to the hanging wall on the eighth level.

Q. Did you see those two walls exposed on the seventh level of the Richmond?

A. Yes, sir.

Q. What is the distance between them there?

A. From "7 M" to "7 G" on the seventh level, the distance is 225 feet, which is from the foot wall to the hanging wall.

Q. You stated just now that you believed the shale hanging wall found at the Jackson is the same as that found in the K. K. and the Richmond, or the same line or belt of shale. What is your reason for that?

A. Because it is the first clay or shale that we find in going through the quartzite out into the limestone in the underground workings.

Q. Is it never found where you enter far enough north, in those workings?

A. It has been.

Q. Is it exposed generally in those workings where you would naturally expect it?

A. It is.

Q. What is its general course?

A. Very nearly east and west.

Q. Have you taken its course at many points?

A. I have.

Q. Have you taken its dip at many points?

A. I have.

Q. What is the dip of that wall?

A. From about 70 to 80 degrees.

Q. Have you taken its dip at almost every exposure of it underground.

A. I have not. The dip is about the same.

Q. Is the quartzite exposed in any of the workings of the Phœnix?

122 A. It is.

Q. At what point.

A. At two points to the east of the K. K. mine.

Q. How far east approximately?

A. At 373 feet from the point "2 F" of the K. K. mine, and at 467 feet from the same point further east.

Q. Now, you have described the exposure of that foot wall in some of the workings of the K. K., the Eureka, and the Richmond mines. What is the general course of that wall from the Richmond to the Jackson?

A. About southeast.

Q. Is the course regular or does it vary at different points?

A. It varies at different points.

Q. At what point is there any material variation that you can point out on the map?

A. From the point "8½ A" of the workings of the Eureka Consolidated to the point marked "2 L" of the K. K. mine.

Q. What is the course of the wall along there, as you estimate it? What does the wall do there; bulge to the north, or is it depressed to the south?

A. It is only found at the point "8½ A" and "2 L;" and from there it bends to the south. The bend is not shown, but it is the same wall, and bends to the south.

Q. Does that wall, at that point on the 8th or the 9th level, bulge to the north, or is it depressed to the south?

A. Are you speaking of the foot wall or of the hanging wall?

Q. The foot wall.

123 A. I was speaking of the hanging wall. It bulges to the north.

Q. Describe upon the map where it bulges, and to what extent.

A. There is a point from "9 S" to "9 T," where the foot wall bulges to the north; in going the distance from "9 S" to "9 T;" it bulges to the north about 80 feet.

Q. Makes a cape there running into the limestone?

A. Yes, sir.

Q. What is the general dip of the quartzite foot walls, or the face of the quartzite?

A. The dip of the foot walls or the quartzite varies very much in its depth.

Q. What is its general dip?

A. Its general dip is to the north.

Q. At about what angle?

A. About 35 or 45 degrees.

Q. How do you account for this variance in the dips; for instance, sometimes to the north; and at the place you mentioned, to the south?

A. It is owing to the bulges in the quartzite.

Q. Was it an irregularity upon the face of the quartzite?

A. Yes, sir.

Q. Can you state whether or not that quartzite foot wall found in the Jackson is the same as found in the Phœnix, the K. K., the Eureka, and the Richmond?

A. In my opinion it is the same. I don't think there is any doubt of it. It has been developed almost the entire distance.

Q. Can you state the distance between the croppings of the Richmond at the top of the Tip-Top incline, and the quartzite on the surface?

124 A. I cannot. It is several hundred feet.

Q. You have not examined them?

A. I haven't laid it down on this map.

Q. The quartzite takes a turn to the south there from the Nugget, coming west?

A. It does.

Q. And you cannot tell what is the exact distance from the surface croppings, or the surface of the north facings, on the quartzite?

A. I cannot.

Q. Are there any workings between the K. K., or in the K. K., or north of the K. K., the Eureka, or Richmond which strike or expose this shale hanging wall except the Bell shaft tunnel which you have described?

A. There is not. There are no workings on the surface. The Utah tunnel opens it, but that is not laid down.

Q. Where is that?

A. It is near the Bell shaft tunnel; about fifty feet distant.

Q. It cuts the same shale outside that the Bell shaft tunnel does?

A. I think so.

Q. Is there any other working or tunnel that comes in from the north and runs south on the north side of these mines?

A. There is the Ruby Hill tunnel running in this direction [showing] which has not been run to the hanging wall.

Q. About what length is it?

A. About 400 feet.

Q. It commences in limestone and its course is about south?

125 A. Yes, sir.

Q. And doesn't reach the hanging wall or the shale?

A. It does not.

Q. Is there any ore exposed in that tunnel?

A. None.

Q. About what depth from the surface is the south end of that tunnel?

A. I should think about 150 feet. That is an approximate estimate.

Q. How often, before the commencement of this suit, have you been in these mines on Ruby Hill?

A. I have been in the Eureka Consolidated and the K. K. mines almost every week for about two years.

Q. Are you familiar with the surface and, generally, with all of the workings on Ruby Hill?

A. I am.

Q. Is there any mine working or producing ore, or is any ore found on the north side of this shale?

A. None that I know of, for some distance.

Q. What distance?

A. The nearest mine that I know of, that is to the Eureka mine, to the north of the shale, is the Racine, which I think is about one mile to the north.

Q. Can you state any other mines that are on the north of that shale, and between the Jackson and the Richmond, producing ore?

A. In the southeast in that direction, I know of no mines.

Q. Where is the Racine situated?

A. It is situated about due north.

Q. Are there any other mines over there?

A. There are some in the neighborhood of the Racine.

126 There are several, the names of which I don't know; that is, on Adams' Hill. That is to the north and northwest of this mine.

Q. And those are the nearest mines that you have ever seen, producing any ore, to the north of that shale?

A. They are.

Judge Sawyer.—Q. Is there any difference in the character of the limestone, or is it only the presence of the shale?

A. None that I could describe. The line north of the shale, in many places, is found stratified. I have never seen any stratified limestone between the shale and the quartzite.

Mr. Thornton.—Q. You stated in one of your affidavits that there were stratified limestone at two or three places between the shale and the quartzite. Why do you make a different statement now?

A. Because that point was on the seventh and eighth levels, and between the points "7 G" and "8 E," "8 D" and "7 L," but I thought that that was within the vein at the time. Afterwards I found the vein in the drift "7 G" of the seventh level; and I came to the opinion that that was the hanging wall of the ledge. And the limestone that I thought was within the ledge, I now think is outside of the ledge. I found stratified limestone there in two points on the 7th and 8th levels.

Q. And at your first examination you thought it was in the vein, and so testified?

A. Yes, sir.

Q. Have you made any close examination of that since?

A. I have, sir.

Q. In going into the same shale extending along that drift

127 that you pointed out, marked "7 G," is that seam of shale in a normal and regular channel as found to the east of that?

A. It is about in its regular course.

Q. About in the regular course of the hanging wall?

A. Yes, sir.

Q. Did you describe the size of the seam of that shale?

A. It is very thin there; less than a quarter of an inch, in places, to as much as 5 or 6 inches.

Q. From your examination of it, and from its being in the normal course of the hanging wall as it curves to the west from the east, you believe that that is a continuation of the one hanging wall?

A. Yes, sir; for that reason, and for the reason that it is the only wall that I found between the quartzite foot wall and the clay seam that has any clay upon it at all.

Q. In all of these workings of the K. K., the Eureka, the Richmond, and of the Jackson, do you find any other wall intervening between this seam of clay and the quartzite?

A. I found no other wall with clay on it.

Q. You found the continuation of the limestone?

A. I did; but I don't think I found any wall of the ledge?

Q. What do you believe about this continuation of the limestone?

A. I believe that is where the limestone has been broken up.

Q. In the interior of the vein?

A. Yes, sir.

Q. And as it is wanting in clay or shale, you conclude that it is not in the wall of the lode. In what direction is this continuation of limestone? Does it run between those two walls?

128 A. It runs in all directions.

Q. How numerous are they?

A. They are very numerous.

Q. Describe in your own way, and fully, the lay of that stratified limestone, and all those bodies and seams of shale at that point where you made a mistake as to the locality of the stratified limestone.

A. At the point "7 G" of the 7th level, is the drift running to "7 H," and the drift is continued from "7 G" to the point "8 E." When I first examined this first portion of the mine I was making my surveys and didn't examine closely. At that time I examined on "7 G" and "7 H," and continued on the drift "7 G" to "8 E."

Q. What did you find at "8 E?"

A. From "7 G" to "8 E," I found stratified limestone. And I didn't notice shale or clay on the wall from "7 G" to "7 H." After making a more careful examination I found a plane face from "7 G" to "7 H;" and I concluded that that was the hanging wall there.

Q. Where was the shale that led you to think the stratified limestone was in a vein.

A. "7 F" and "7 G." I then found clay at "8 E," on the seventh level. And I thought that the clay from "7 J" and "7 F" continued to "8 E," which perhaps it does; and I think from the developments that it does continue there; but there is also a clay seam that I think contains ore there, from "7 F" to "7 H."

Q. Which you think is the true wall of the lode?

A. Which I think is the true wall of the lode.

Q. But that stratified limestone was within that body of shale that turns off suddenly to the north there, was it?

129 A. It was.

Q. And that caused you to be misled?

A. Yes, sir.

Q. Is there any stratified limestone on the surface anywhere north of this slate hanging rock?

A. There is, in several places.

Q. Can you describe the point?

A. There is a point to the north of the Richmond shaft in the railroad cut. There are several points near the Jackson mine; but I have examined very carefully between those two points to see whether there is any stratified limestone between those two points.

Q. And that tunnel driven from the bottom of the Jackson shaft passes through stratified limestone. Now, if you find any stratified limestone within the vein, on the south of the shale hanging rock, isn't that a difference between the limestone as found at some places outside of the shale, and within it?

A. Yes, sir.

Q. So, in speaking to Judge Sawyer, you didn't refer to the stratified limestone?

A. I refer to its appearance with the naked eye.

Q. Have you ever made any analysis of that rock there in that vein?

A. I have not.

Q. You are not familiar with that matter, I suppose?

A. No, sir.

Q. Are there any mines worked in that body or belt of quartzite, between the Jackson and the Richmond mines, to the south?

A. None that I know of.

Q. Have you ever known of any ore being taken out of that quartzite?

130 I have known of no pay ore to be taken out of that quartzite.

Q. Do you know of any rock being taken out of the quartzite, used for any purpose?

A. Rock has been taken out of the quartzite drift of the Eureka Consoldated that has been used for fluxes; and rock has been taken out of the quartzite from the Richmond workings which I have been informed was used for fluxes.

Q. Have you been into the points in the body of the quartzite from which that quartzite was taken for fluxes?

A. Yes, sir.

Q. What is the appearance of the quartzite in there?

A. It looks like it might contain a small amount of silver.

Q. Does it contain anything else that would make it useful as a flux?

A. It contains iron.

Q. That was the element that was of value to make it a flux, was it?

A. Yes, sir.

134 Q. Have you marked upon the map at any point the lode X W prolonged to the north?

A. I have.

Q. Point it out.

A. C is the line, X W prolonged.

Q. Does that line pass through the Potts chamber, as represented on the map?

A. It does.

Cross-examination:

By Mr. Wren.—Q. is this model of yours correct?

A. In some places it is incorrect.

Q. Is it correct as it stands now?

A. It is not exactly, as it stands now.

Q. What is there that is not exact about it?

A. There is the hanging wall, as I have found, that second wall of the K. K. mine, and also the development as found on the 8½ level of the Eureka. The ore abuts in the Richmond mine, which I have never been able to survey.

Q. Is it correct in other respects?

A. In one or two places the dip of the under wall has to be changed from the present developments.

Q. Is it correct in all other respects, just as it stands?

A. I believe it is correct.

Q. Will you walk to the model? What direction is northeast on that model; what direction is east, and what direction is west?

A. [Witness shows.]

Q. Does the Richmond mine lie to the east of the Eureka Consolidated?

A. The Richmond mine lies to the west of the Eureka. But the model is turned around.

135 Q. Can you turn it in any position so as to make it right?

A. Yes, sir; I will arrange the plates after a while.

Q. Then the model is not right, as it stands?

A. The model is correct, but turned around.

Q. How do you mean turned around?

A. It has got to go end for end.

Q. Well, turn it end for end.

A. I will have to take out the plates and change them. I could change the plates so that this would be correct.

Q. Turning the plates end for end, they would be correct?

A. Yes, sir.

Q. The model is not correct, as it stands?

A. The model is not correct, as it stands, because this must go there [showing]. I didn't notice it before, in putting the plates together.

Q. You are a United States mineral surveyor?

A. Yes, sir.

Q. Did you make a survey for a patent for 3 mining claims of the Richmond company, lying in here?

A. I did, sir.

Q. Why did you put the other claims of the Richmond company upon the map, and not those claims?

A. These claims are surface claims, and I thought they had no bearing upon this case.

Q. Did you not know that they had a very important bearing upon the case?

A. I did not, sir.

Q. You know that there is ore throughout these apparently barren spaces upon the map, don't you?

A. Are you speaking of the surface?

136 Q. No, sir; the underground workings of the Richmond mine.

A. Yes, sir; there is ore there.

Q. Why don't you put the ore on the map from the chamber marked "ore-chamber" to the Potts chamber?

A. Because I could not get into those chambers to survey them.

Q. Did you get into that chamber to survey it? [Showing.]

A. No, sir.

Q. Or into this one? [Showing.]

A. I did, a portion of it.

Q. Did you survey the whole of it?

A. I surveyed a portion of it; that portion of it I could survey; it was very dangerous.

Q. Then you did not put that chamber on from actual survey?

A. That I put on there is from actual survey. I could not get into the chamber at this point [showing]; and the ground at this point [showing] was caved in.

Q. You have made surveys there on the ground, haven't you?

A. No, sir; never. The first time I was ever down there was when I made that map.

Q. Why don't you put the ore of that portion down here on the map?

A. It is all on that I know of, and down there.

Q. There is a drift driven from "7 F," on the seventh level of the Richmond, twenty feet to the north, why wasn't that put on the map?

137 A. It is put on the map up to the time I made my last survey of the mine. They have been continuing levels in various portions of the mine all of the time, and it was impossible for me to keep up all of the levels.

Q. There is another level or cross-cut driven from the point "S E" to the south. Why wasn't that put on the map?

A. It is put on the map.

Q. What is its length?

A. Ten feet.

Q. There is one over twenty feet, is there not?

A. Not that I know of. When I made my survey there was not.

Q. You never examined on ent "7 F" for twenty feet along the line of the shale?

A. I examined it to its end along the line of the shale.

Q. The shale crosses the seventh level of the Richmond at 7 F, nearly at right angles with the course of the level, don't it?

A. Very nearly at right angles.

Q. And runs directly north?

A. Yes, sir.

Q. And it is found running north and south at "8 E?"

A. It is.

Q. Then the shale you call the hanging wall, that is ent in the Richmond 7th level, does not run along here from the point marked "7 G" to the point marked "7 H," does it?

A. The shale that I call the hanging wall is the first shale that I find from the quartzite in going north of it; and the first shale I find in the drift running from "7 G" to "7 H."

Q. The shale that is found at "7 F" and at "8 E." on the 7th level of the Richmond, is not the same shale that is found at "7 G" and "7 H," in the 7th level of the Richmond?

A. It is not. They may connect, but they never have shown any connection.

Q. Now there is no shale from "7 H" to "7 G," is there?

A. There is what I call shale; and there is shale along upon the smooth wall, which is from ¼ of an inch thick in some places to 6 inches in other places.

Q. What is any shale?

A. I don't know except from its appearance. I don't know its component parts.

Q. Have you had any conversation since yesterday with any one in relation to the shale just referred to?

A. I have, sir; with Mr. Keyes.

Q. With anybody else?

A. With Colonel Thornton.

Q. You modified your testimony to-day, somewhat, on Colonel Thornton's examination, from what you gave yesterday on the point, didn't you?

A. I don't remember any modification that I made upon that point. I don't think I made any modification.

Q. You testified in this case before, didn't you, or spoke in another case in which the same questions were involved, in Illinois, sometime in February or March last?

A. Yes, sir.

Q. Your testimony differed very materially then from what you have testified to now, didn't it?

A. I don't see any material difference.

Q. Did you testify that you had?

139 A. No, sir; only when I went through and made my surveys.

Q. When did you first hear of ore stains?

A. A long time; ever since I have been working in the mines in Ruby Hill or in Treasure Hill.

Q. What is an ore stain?

A. It is decomposed limestone, containing iron and some silver, I concluded.

Q. Why did you concluded it contained some silver?

A. Because I had seen specimens like that from which assays had been taken that gave results in silver and lead.

Q. Then when you testified yesterday in regard to the ore stains, you meant to testify that at all points where you found ore stains in the workings there was broken limestones mixed with iron that would assay something in gold and silver?

A. That is what I meant.

Q. On your examination at Eureka you testified that there was nothing but barren limestone in most of the places that you testified there were ore stains yesterday?

A. I did. I had not at that time made a critical examination of the mine.

Q. What is ore?

A. Ore is gang contained in silver and other precious metals.

Q. What is a lode?

A. A lode is ore or a gang containing ore between walls?

Q. What is a wall?

A. A wall is a fissure, or a division between two formations.

Q. Then you may have walls without a lode, as well as with?

140 A. You may.

Q. When you testified that there is a quartzite foot wall on Ruby Hill, what do you mean?

A. I mean that there is a belt of quartzite running along through Ruby Hill, which, I believe, forms the boundary of the ore on the south.

Q. Do you mean to be understood that it is the wall of a lode?

A. I do. I mean that that contact is the wall of a lode.

Q. What do you mean by a shale hanging wall?

A. I mean something that I believe to be shale that forms the northern boundary of the ore-channel, or ore.

Q. I suppose the ore-channel and the lode are all the same.

A. I believe so.

Q. With what is that ore filled?

A. It is filled with limestone and ore.

Q. What proportion of limestone do you think there is in the lode as compared with the ore?

A. It would be very hard to make an estimate of the proportion. There is a great deal more limestone than there is ore.

Q. About how much?

A. I could merely give you a very rough approximation. I would say about fifty times as much, or one hundred times as much.

Q. Have you any theory of the mode of deposit of the limestone within what you call this lode?

A. I have not, sir.

Q. Have you any theory about deposit of lodes?

A. I have not.

Q. You know nothing in relation to it?

A. No, sir.

141 Q. Have you read nothing about it?

A. I have read something about it.

Q. Have you formed any opinion from what you have read?

A. No, sir; I have not.

Q. How are you able to say that this is a lode or not, unless you have some opinion about its formation?

A. I have read various theories as to the formation of lodes, and from them I have formed some opinion upon the matter.

Q. Then you have same opinion about the formation of a lode?

A. I have.

Q. What is that opinion? How is a lode formed?

A. That I don't care to state; I am not a scientific expert, and I do not care to give my theory. I had rather not be cross-examined upon my theories of the formation of lodes.

Q. You say you have a theory in regard to it?

A. I have had numbers of theories in regard to it.

Q. Is your opinion sufficiently well formed to enable you to say that this is a lode?

A. I believe that that is a lode from what I have seen, and my experience with lodes, and from what I have read.

Q. What is your opinion about the mode or formation of the lodes?

A. I had rather not give my opinion. I believe the limestone was laid there from the bottom of the ocean. But how the ore got in I don't know; perhaps it came from below.

Q. You believe the quartzite was laid down in the bottom of the ocean, don't you, in the form of sandstone?

A. Yes, sir.

142 Q. That the limestone was deposited on the quartzite?

A. Yes, sir.

Q. In a stratified form?

A. In a stratified form.

Q. That the shale was deposited upon the limestone?

A. Yes, sir.

Q. And then limestone again deposited upon the shale, and then quartzite probably again on the limestone?

A. Yes, sir.

Q. So that we have different bodies of quartzite, shale, and lime-

stone running through that district; quite a large number of them?

A. Yes, sir.

Q. We find limestone and quartzite and shale raised to many thousand feet above the body of the ocean at the present time?

A. We do.

Q. Have you an idea that during the process of upheaval, fissures were formed in the limestone?

A. I do.

Q. Would not fissures also be very likely to be formed in the quartzite?

A. I suppose there are fissures in quartzite.

Q. Also in the shale?

A. I have never seen any fissures breaking or separating through the limestone and through the shale.

Q. Well, after the fissures were formed by the force that raised this rock to its present level, what do you think occurred?

A. I think that that belt of ore, or ore-channel, is the lode or channel through which the ore came up from below, or from
143 above. I don't know where it came from. But that is the only channel through which ore has been found.

Q. This limestone did not form a channel, did it? It formed a body of rock as much as the quartzite or shale?

A. It did.

Q. There were fissures, however, in the limestone?

A. A great number.

Q. And your idea is that the ore came out in solution from below, through these fissures, or from above, with these fissures?

A. That it came up from below.

Q. In the form of solutions?

A. Yes, sir.

Q. Limestone dissolves out readily, doesn't it, when water is passed through it?

A. Yes, sir; I believe it does.

Q. That is particularly the case if the waters are charged with carbonic acid?

A. Yes, sir.

Q. The probabilities are that as the waters containing the ore in solution pass through these fissures from below, that it would dissolve the limestone more in some places than in others?

A. Yes, sir; I believe it does.

Q. Don't you believe that is the way those large cavities are formed, in which the ore was subsequently deposited in this limestone?

A. I do.

Q. I understood you to say that the lode was a fissure in the rock containing ore?

A. You certainly misunderstood me. I didn't say that a lode was a fissure at all.

Q. Isn't a lode a fissure or a cavity in the rock, containing ore?

144 A. I don't understand it to be such.

Q. In what respect does it differ from that?

A. A fissure may be a break in a single formation, or it may be between two formations; and I say that this lode is limestone and vein matter, and ore that rests upon the quartzite, and is between the quartzite and the first shale.

Q. In what respect does a lode differ from the definition I have given? You find ore in the lode, don't you?

A. I do.

Q. You sometimes find masses of the country rock, called horses?

A. I do.

Q. And you sometimes find quartz that was deposited at the same time that the ore was deposited, that is barren of metal?

A. Yes, sir.

Q. Now, is there anything else found in lodes? Does anything else go to make up the filling of a lode, except the ore and gang or matrix proper, and the horses or masses of country rock that have fallen into the fissures during the process of filling?

A. I believe that that is all that constitutes a lode.

Q. Has that mass of limestone, lying between the quartzite and the shale, fallen into anything?

A. It has not fallen into anything.

Q. Then it is not a mass of limestone that has fallen into a fissure during the process of its filling with ore?

A. It is not.

Q. But it is rock in place?

A. Yes, sir.

145 Q. You do find, however, in all of those bodies of ore on Ruby Hill, the ore and masses of country rock mixed in with the ore, don't you?

A. I do. That is, the masses of the limestone within the lode mixed in with the ore.

Q. Loose masses; not in place?

A. Loose masses.

Q. If that be the case, and you find one of those ore-bodies limited on all sides by the limestone, why would you not call the ore and such masses of the country rock as may be found lying within the ore-body, the lode; and the limestone the containing rock, the walls of the lode?

A. I would not call that the lode, because at several points I find the ore extending from the quartzite to the shale. And the the ore in coming up from below, I think, has followed the line of least resistance, and in places has followed these fissures, and there made the cavities and deposited the ore.

Q. The walls of the lode or ore-body is the rock that bounds the ore-body, isn't it?

A. The walls of the ore-body may be the rock that bounds that ore-body; but that ore-body may be within a ledge, and the rock that bounds the ore-body may not be the rock that bounds that ledge.

Q. If you find an ore-body extending from the shale to the quartzite, the shale would be the wall upon the one side, and the quartzite upon the other, wouldn't it?

A. Yes, sir.

Q. If you find the ore-body extending from limestone to limestone, bounded upon either side by limestone, the limestone would be the walls of the lode, wouldn't it?

A. The limestone would be the walls of that body of ore, but not of that lode.

146 Q. Then the shale or quartzite can be the walls of the ore-body, or the limestone can?

A. Under the circumstances there, it cannot.

Q. In other words, you maintain that the whole limestone lying between the quartzite and the shale is a lode. By what process did that become a lode?

A. By the ore that came up from below and filled all of that limestone between the quartzite and shale with ore. In some places it rests upon the quartzite, and at other places it rests upon the shale, and in other places it is bounded entirely by the limestone; but in no place have I ever found a body of ore back in the quartzite or outside of the shale.

Q. Didn't you testify a short time since that a large body of ore had been taken from the quartzite in the Eureka mine?

A. When I say ore, I mean ore that it will pay to work. The quartzite that was taken out for fluxes would not have assayed over two or three dollars to the ton, and was taken out merely for the purpose of fluxes, and not for the ore that was within the quartzite.

Q. I asked you very soon after I commenced this examination, what you called ore, and you told me that it was rock containing gold, silver, or precious metals?

A. Yes, sir.

Q. Now you say ore is rock that is taken out to work?

A. No, sir; you misunderstood me. If I said ore, I did't intend to say so.

Q. What do you call ore, again?

A. Ore is rock containing silver and precious metals, without any regard to its value.

147 Q. Then there was a large amount of ore taken out of the Eureka in the quartzite?

A. Yes, sir; but not in paying quantities. The quartzite was a very small amount, and was used for fluxes.

Q. How do you know it was not taken out in paying quantities?

A. From what I have heard and from its looks.

Q. Wasn't the air of Eureka full of rumors, and also the papers

up there, that a second Comstock had been found in the Eureka Consolidated, when they were taking that quartz out?

A. Yes, sir; and the air of Eureka and the papers are always full of some such rumors.

Q. And that the ore was worth $30 or $40 a ton?

A. Yes, sir; I have heard from general rumor that it was worth from $40 to $70. But I have seen the rock, and I could judge about what it would pay from looking at it.

Q. Can you tell from looking at ore what it will pay?

A. When I see samples of rock that have been assayed, from a particular place, I know what the assayers give; and when I see another sample of rock from the same locality, I think that I can judge something of the value of that piece of rock.

Q. Have you explained the only reason you have for regarding the whole of the limestone included between the quartzite and the shale as a lode?

A. I have given the entire reason that I have.

Q. You gave to Mr. Thornton an additional reason, didn't you?

A. When I say that I have given all of my reasons, I mean the reasons that I have given during my entire examination.

148 Q. You don't mean to say that more than one-fiftieth part of the space lying between the quartzite and the shaft in those mines is filled with ore?

A. I corrected that, and said I thought about one-hundredth part.

Q. All of the balance in limestone?

A. Yes, sir.

Judge Sawyer.—Q. Have you ever seen a lode where either one or both walls were limestone?

A. I have. I have seen them in White Pine; a narrow fissure in the limestone, with smooth walls on each side, and ore all of the way between those two walls.

Q. Then that would be a lode?

A. Yes, sir.

Mr. Wren.—Q. Have you seen the same thing in Eureka?

A. Yes, sir.

Q. The ore that you find in the limestone is quite as rich as your stains, isn't it?

A. In some places it is.

Q. Your ore in quartzite is quite as rich as your ore stains?

A. No, sir; some of my ore stains will go $20 to $50 in silver, some gold, and some lead. I have never seen but one ore from the quartzite that contained lead.

Q. What is the difference between the ore and the ore stains?

A. No difference.

Q. Why do you use both terms?

A. In some places it is very low grade, and for that reason I called it ore stains.

Q. It is ore, nevertheless?

A. Yes, sir.

149 Q. So you prefer to call it ore stains to calling it ore?

A. Yes, sir.

Q. In what manner has the limestone become unstratified?

A. That I suppose is by the chemical waters that passed up through the ledge. I have heard, and I believe that theory.

Q. The limestone has been metamorphosed?

A. Yes, sir

Q. Does metamorphism form one of the modes in which lodes are formed?

A. I presume that it does. I don't know.

Q. What is marble?

A. I could not tell you.

Q. Marble is metamorposed limestone, isn't it?

A. Yes, sir; I suppose so.

Q. What is quartzite?

A. Quartzite is sandstone, I believe.

Q. Metamorphosed sandstone, isn't it?

A. Yes, sir.

Q. Why isn't quartzite a lode—it has been metamorphosed?

A. It has been metamorphosed, and it may be a lode of quartzite. But it contains no ore-bodies that will pay to work.

Q. What is the shale; is that metamorphosed?

A. I don't think it is.

Q. What is the limestone lying to the northeast of the shale?

A. In places it has been metamorphosed. In others, it retains it original stratification.

Q. Is there no place where it has not been metamorphosed?

A. I think there are several places.

150 Q. Does mere metamorphism always destroy the stratification?

A. That I cannot say.

Q. Then the only reason you have for thinking it is not a metamorphosis is that it is stratified in places?

A. Yes, sir.

Q. In places it is not stratified?

A. It is not stratified in places.

Q. Where it is not stratified, then, it is metamorphosed?

A. Yes, sir.

Q. Why is not that a lode?

A. Because there is no regularity to it. And I call this a lode, because it contains ore. Outside of the limestone, or the limestone outside, I know of no ore.

Q. Do you know a claim lying between the Lawton and the Skylark shafts?

A. The Skylark shaft would be about this point [showing.] It is in the shaft there; but I have never examined it. That is in the Skylark shaft.

Q. Where does this shale run on the surface with reference to the Skylark and Lawton shafts?

A. The Skylark shaft is outside of the shale. The Lawton shaft I believe to be within the shale.

Q. Where does the shale run, in your opinion, with reference to the Lawton shaft; on the surface?

A. About the point "9 E" of the 9th level; and between the points "9 A" and "9 B" of the 9th level.

Q. Do you know whether ore was found in the Skylark mine or not?

A. I have followed down the Skylark shaft a long distance; and I don't think that there was ever any ore there found that would assay anything in silver or gold.

151 Q. Do you know whether there was any found near the surface of the Skylark or not?

A. The limestone seemed to be mixed with iron—that that I saw near the surface. But I don't think it would assay anything in silver; and it was very small in quantity.

Q. You think the iron inside the quartzite and shale would assay something in silver; but outside not?

A. That outside of the Skylark had a different appearance.

Q. Are you well acquainted with Prospect mountain?

A. I am, sir.

Q. A very large number of mining claims are located on Star mountain, are there not?

A. Yes, sir.

Q. It has a quartzite western boundary, hasn't it?

A. Yes, sir.

Q. And a shale eastern boundary?

A. I don't know about that. I have never seen a shale eastern boundary. I have never seen that shale on Prospect mountain.

Q. Down on the eastern slope, down to the Dunderberg?

A. Yes, sir; I have.

Q. There are two belts of shale running through that country there, are there not?

A. I know of only one belt.

Q. Have you ever been at the Bald Eagle mine?

A. Yes, sir; but I have never been down in the shaft.

Q. Don't you know that the gulch at the mouth of the Bald Eagle mine is cut through the shell?

A. I do not.

152 Q. And that the shell continues on over to the northeast?

A. No, sir; I never examined it sufficiently to state.

A. You do know that there is a belt of shale runs by the Dunderberg?

A. Yes, sir.

Q. That forms, then, the eastern shale boundary of Prospect mountain?

A. It does.

Q. Are there not a great many more croppings of ore on the surface of Prospect mountain than there are on Rub: Hill?

A. In some places there are a great many croppings on Prospect mountain. I could not state whether there are more than within this lode or not.

Q. You find iron croppings that evidently contain some silver and gold, if you can judge by the eye at all, nearly all over the side of Prospect mountain?

A. I find a great many croppings.

Q. The material of Prospect mountain is metamorphosed?

A. Yes, sir.

Q. Why isn't that a lode?

A. I don't think it is a lode, because the ledges that are found on Prospect mountain are narrow, and I have never examined them; but I know that in no place does the ore extend from the quartzite to the shale. They are merely small bodies of ore in the limestone.

Q. You think, then, that the mere fact that at some one, two, or a few places ore extends from quartzite and shale is perfect proof that it is a lode?

A. And that ore is not found outside of the shale in large quantity, or in any quantity, or in the quartzite in paying quantity. I would call that a lode.

153 Q. Are you acquainted with the Lookout mining claim?

A. I am.

Q. You made a survey of it for a patent?

A. I did.

Q. What is found on the surface in the mining claim?

A. There are some places in which you find iron mixed with linestone, on the surface.

Q. At what places?

A. Various places around on the surface of the ground.

Q. Give me some one of the classes?

A. I could not.

Q. You find carbonate ore up there on the surface, don't you?

A. I don't remember any carbonate ore between the boundaries of the Lookout claim on the surface.

Q. What kind of limestone is that in the Lookout?

A. The same as you will find all through the vein.

Q. Have you any name for it?

A. No, sir.

Q. Never had a name for it?

A. No, sir.

Q. What is a "bedding of limestone?"

A. The layers of the stratification.

Q. You never find a bedding in limestones, except where the limestone is stratified?

A. I believe not.

Q. You have made several reports to the United States land office, haven't you?

A. Yes, sir; a great many.

Q. Made a report on the Lookout mine?

A. Yes, sir.

154 Q. It was your duty to do so?

A. Yes, sir.

Q. State whether you recollect working this report on the Lookout? [Reads:]

"This claim is located upon unsurveyed land, and the U. S. surveys have not been extended near enough to this to connect with that. The survey of this claim embraces 400 feet in length by 200 feet in width; embracing a lode or deposit 100 feet in width on each side of the centre thereof." Does that lode run through the centre of the Lookout claim?

A. It claimed to run through the centre.

Q. "Along the present general course of the said lode or deposit, etc." "The lode or deposit is found in coraline limestone, the bedding of which is nearly horizontal. No body of ore has been discovered within the limits of this location, but it claims its value more from the developments made upon the adjoining claims. The adjoining claim, the Eureka Consolidated mine, to the south, shows a bed or deposit of ore running northwesterly; and ore deposits extend under this body of Ruby Hill, and with a cap of limestone covering the lode at this point, exceeds in thickness of the cap covering the Buckeye, Champion, etc. At different points, for the entire width of the location, good indications of ore-body are found. The indications exist of a mixture of carbonate of lime with the surface limestone." Did you make that report to the United States land office?

A. That is all of my report.

Q. And yet you never found any carbonate of lead on the surface of the Lookout?

A. Never, that I know of.

Q. And the limestone is not stratified in the Lookout?

155 A. No, sir; that report was made from the notes given me on the ground by a party whom I supposed knew the ground; and I didn't examine it very carefully. And it was made when there were very few developments in the Richmond and Eureka ground.

Q. There were developments enough to show whether or not the limestone was stratified, wasn't there?

A. Yes, sir.

Q. Couldn't you see, in making your survey, whether the limestone was stratified or not?

A. I didn't examine it as carefully at the time as afterwards.

Q. Is it possible for a man to pass over a surface of stratified limestone without seeing that it was stratified?

A. When he is making a survey, and paying attention to his survey, I think it is.

Q. Were you informed that that was coraline limestone?

A. Yes, sir.

Q. And therefore you so reported?

A. Yes, sir.

Q. You were performing an official duty, under oath?

A. Yes, sir.

Q. Are you in the habit of certifying things to the department on what others tell you?

A. When I made a report on a mine, I would generally take the word of some person who knew the mine better than I did.

Q. You knew what carbonate of lead was at that time, didn't you?

A. No, sir; I don't think I could have told that; I think those were the first mines containing carbonate of lead that I had ever seen.

156 Q. You had been surveying for the Eureka Co., sometime before that, hadn't you?

A. No, sir. I don't think I had ever made an underground survey for them before that time.

Q, When did you first hear the shale spoken of as the hanging wall of a lode?

A. Several years ago when I found the shale in the K. K. mine, at the point "3 R;" and it was following to the point "3 D." I then came to the conclusion myself that there was a hanging wall of the ledge.

Q. How many years ago was that?

A. I think about three years ago. I could not say positively.

Q. You maintained very stoutly for a long time that there was no such thing as a lode on the hill at all?

A. Yes, sir; I did.

Q. You didn't believe that there was any such thing as a lode on the hill?

A. No, sir; not on Treasure Hill, at that time.

Q. When did you alter your opinion about there being a lode on Ruby Hill?

A. The deep developments made in the mine, and also the developments on Treasure Hill.

Q. When?

A. About the time I found the hanging wall in the K. K. mine.

Q. About three years ago?

A. Yes, sir.

Q. Did you impart that information to any one?

A. I conversed with several parties about it.

Q. When did you ever hear the quartzite spoken of as the foot wall of the vein?

A. A number of years ago, almost as soon as I was acquainted with the Eureka mine.

157 Q. You never believed it to be the foot wall of a lode?

A. I did not.

Q. When did you alter your opinion in regard to that?

A. About the time the developments were made in the K. K.

Q. I cross-examined you, when you were examined before, in reference to this mine, at Eureka?

A. Yes, sir; you did.

Q. You testified, on that occasion, that the 9th level of the Eureka Consolidated commenced at the Lawton shaft, and ran 63 feet through barren quartzite, didn't you?

A. I believe I did.

Q. That it ran from the quartzite to a point marked "9 S," through barren limestone?

A. I did.

Q. That it then ran through barren quartzite to "9 T?"

A. Yes, sir.

Q. That it ran from "9 T" to "9 N" through barren limestone, also?

A. Yes, sir.

Q. You testified that the 8th level of the Eureka ran from "8 D" to "8 F" in barren limestone?

A. I did.

Q. What is the distance between those points, on the 8th level?

A. In a straight line, 365 feet.

Q. And on the 9th level, a distance of about 1,000 feet, wasn't it?

A. About 750 feet.

Q. Through barren limestone?

A. Yes, sir.

158 Q. And how far through barren quartzite?

A. 200 feet.

Q. 950 feet in all?

A. Yes, sir.

Q. From "8 F," you testified that the 8th level of the Eureka ran through barren limestone to the end of the level?

A. I did.

Q. What is that distance?

A. 400 feet.

Q. You testified that the 7th level of the Eureka ran from "7 G" to the end of the level, at that time, through barren limestone, didn't you?

A. My recollection is that I had noticed the ore-body at "7 H." I think that I mentioned it in my evidence, though I won't be positive.

Q. You testified that it ran through barren limestone, with the exception of a small distance at "7 H," didn't you?

A. Yes, sir.

Q. The 6th level of the Eureka has never been extended out to the northwest any considerable distance, has it?

A. It has not.

Q. You testified that the 5th level of the Eureka, from "5 C" to to the Bell shaft, or to the end of the level, was driven through barren limestone, didn't you?

A. No ore has been taken out and worked.

Q. By whom was the Bell shaft sunk?

A. William H. Shaw.

Q. For what company?

A. The Eureka Consolidated Mining Company.

Q. Who ran the tunnel?

A. The same company.

Q. When was that done?

159 A. About two years ago, I think.

Q. Expensive hoisting works were put up on the Bell shaft by the company?

A. Yes, sir.

Q. Are those hoisting works there now?

A. They are not.

Q. They were moved by the company?

A. Yes, sir.

Q. When were they removed?

A. They were removed, I think, about 18 months ago.

Q. Do you know why?

A. I do.

Q. Why?

A. Because the mine had been opened through the Lawton shaft down to about the 8th level. The machinery was not sufficient to work the shaft at any greater depth, and one of the levels of the mine had been connected with the Lawton shaft; and this machinery was put on the Lawton shaft to enable them to get more power to work the mine through that shaft.

Q. Wasn't it removed because they found no indications of ore at that point?

A. It was not.

Q. Did they find any ore or indications of ore to follow up at that point?

A. They did not.

Q. How deep was that shaft?

A. I think the shaft had been sunk about 160 feet, and then from the 5th level was a raise and winze.

Q. What was the shaft sunk through?

A. Limestone.

Q. What was the raise raised in?

A. Limestone.

Q. Did they have and use a diamond drill there?

160 A. Yes, sir.

Q. What did they get out with it?

A. That diamond drill was used for the purpose of making the work easier in sinking the shaft.

Q. They kept prospecting with that diamond drill all of the way down, and found limestone until they got to the quartzite?

A. No, sir; they didn't get to quartzite; they didn't go within 60 feet of the quartzite.

Q. Didn't the diamond drill go to quartzite?

A. No, sir.

Q. How long has it been since this Champion chamber was worked out?

A. They continued the work on the Champion chamber to within one year, I think.

Q. During that time they were very short of ore, were they not?

A. A portion of that time they were short of ore.

Q. Why wasn't the work continued on that chamber?

A. Because all of the pay ore that they can find has been taken out.

Q. Why didn't they explore farther from that chamber.

A. You will have to ask the superintendent that.

Q. Were you not the surveyor all of the time?

A. Yes, sir.

Q. Still you don't know why they did not?

A. I do not.

Q. Who worked out these ore-chambers?

A. A portion of them were worked by the Richmond Mining Co., and a portion by the Eureka Consolidated.

Q. What portion was worked by the Richmond Mining Company?

161 A. The ore-chamber "W," and the ore-chambers to the northwest, to the compromise line. The ore-chambers to the southeast of that were worked by the Eureka company.

Q. When was the ore-chamber marked "C" worked?

A. At various times; a part under Mr. Shaw's administration, and a part under Mr. Donnelly's.

Q. Is the delineation on the map from actual survey?

A. It is. Most of the chambers was from actual survey.

Q. What portion of it is not from actual survey?

A. That portion of it marked "D." The ground has been stoped up, above the level, and I have worked it there as stoped above the level. But the stopings have caved in, and it is impossible to get in there to measure the chamber.

Q. When was the actual survey made from which that portion of it was taken?

A. That is two years ago. I could get in there then so as to make the survey.

Q. But it is not made recently?

A. No, sir.

Q. What are the relative levels of the ore-chamber "C," and the first level of the Eureka Consolidated?

A. I think it is about 70 feet above the first level of the Eureka Consolidated.

Q. The ore-chamber "C"?

A. Yes, sir.

Q. What is the relative level of ore-chamber "C" and ore-chamber "S. B."?

A. They are very nearly on the same level. I think a portion of ore-chamber "C" is above; and a portion below ore-chamber "S. B."

162 Q. What is the relative level of ore-chamber "W" and ore-chamber "C"?

A. Ore-chamber "W" is lower than ore-chamber "C;" I should think it extended about 40 or 50 feet lower.

Q. In what direction does the quartzite run in the northwest end of the fifth level of the Eureka Consolidated?

A. About south, 15 west; approximately.

Q. That is at right angles with what you have given as the general course of the quartzite?

A. It is about at right angles.

Q. In what direction does the ore dip that is found at the foot of the fifth level of the Eureka?

A. It dips with the quartzite wall; a dip nearly north.

Q. It dips a little west of north, don't it?

A. In one place it is east of north, and in another place it is west of north.

Q. The dip of the lode is always at right angles with its course, isn't it?

A. Yes, sir.

Q. That is certain, always?

A. Yes, sir; when it is at right angles with its general course.

Q. If you want to get the general course of a lode, you take the dip at right angles, as it might vary at particular points?

A. It might.

Q. But at any given point the dip of the lode is always at right angles with its course?

A. I believe that is correct.

Q. In what direction does the quartzite run, on what is called the 6th level of the Eureka, at the northwest end?

163 A. It runs about southwest.

Q. Is there any ore found on the quartzite at that point?

A. There is.

Q. What is the dip of the ore at that point?

A. About northwest.

Q. What is the course of the quartzite at the end of the seventh level of the Eureka?

A. About west; that is, true east or west.

Q. Have you, in giving the courses throughout your examination, given the magnetic or the true course?

A. I have given in nearly all cases the magnetic course; I don't remember giving any courses during my examination, except as a general course.

Q. In what direction does the quartzite run at the end of the eighth level of the Eureka?

A. Very nearly north.

Q. What is the distance in perpendicular depth between the seventh and the eighth level of the Eureka?

A. 100 feet.

Q. Then in rising 100 feet, from the 8th level of the Eureka to the 7th, you find the quartzite turning around at exactly right angles?

A. You do.

Q. And you found the ore that is lying on the quartzite dipping to the northwest instead of the northeast?

A. I found the ore lying upon the quartzite wall, and dipping with the quartzite wall.

Q. In what direction does the ore dip that you find on the 9th level of the Eureka?

A. Nearly easterly.

Q. And 200 feet above there, you find ore dipping to the northwest?

A. Yes, sir.

164 Q. Of course at right angles with each other?

A. Very nearly.

Q. And yet you think it is all nearly one lode?

A. I do, sir. I have never known in any mine a regular foot wall for any distance.

Q. Did you ever know any such irregularities as that?

A. Yes, sir; I think I have known more than that.

Q. Where?

A. In Austin.

Q. Know them to turn at right angles in Austin?

A. Yes, sir.

Q. For instance?

A. Well, in the Isabel.

Q. Turn in right angles?

A. To turn in right angles.

Q. In what direction does the lode turn?

A. Northwesterly.

Q. Were abouts is it that the lode turns at right angles?

A. I could not give you the point exactly. I remember the

irregular foot walls; but there are many in Austin running in right angles in places.

Q. There are no foot walls of lodes that are not irregular, are there?

A. I have never seen any that were not.

Q. Did you ever see any that were as irregular as this?

A. I think I have.

Q. Where?

A. In Austin.

Q. In what mines?

A. In nearly all the mines there. In the North Star and the Isabella.

165 Q. What mines is nearest the Isabella on the east, at Austin?

A. I forget the names of the mines.

Q. Can you go more than one hundred feet east or west in that belt of mines without coming to another mine on those ledges?

A. We never have any ledges in Austin to run together, except where the Esther crosses the North Star.

Q. I am not speaking of the ledges running together. There are a large number of parallel ledges in the vicinity of the Isabella.

A. Yes, sir.

Q. Are any two of those ledges more than one hundred feet apart?

A. Not that I know of.

Q. You have never known of those ledges crossing each other?

A. Except in one case.

Q. And yet you do not know that some of those ledges have foot walls more irregular than the foot wall here, as you call it?

A. I do.

Q. If any of those ledges were to turn at right angles with their general course, and run three hundred feet, they would have to cross three or four other ledges, would they not?

A. Unless the other ledges turned at the same time. But I have never known one of them to take such a turn as that.

Q. Have you ever known one of them having a cape on the foot wall running out three or four hundred feet?

A. I don't remember. But very few of them have been traced that far.

166 Q. There is such a cape as that here in the foot wall?

A. I don't know of any such.

Q. What is the distance that that cape runs?

A. About one hundred and sixty feet.

Q. Do you know where the quartzite runs here on the surface? [showing.]

A. I do not.

Q. Don't it run four hundred feet at right angles at that point?

A. It may. I have not examined that on the surface.

Q. The quartzite runs along the surface here?

A. Yes, sir; above R on the Nugget plane.

Q. And along near the upper line of the Savage?

A. Yes, sir.

Q. Across the ridge at the point that is not shown on your map?

A. It does.

Q. Will you say it don't run in here three or four hundred feet at right angles with its general course?

A. I would not.

Q. What course does it run after you leave the K. K?

A. It turns more suddenly.

Q. It turns off directly to the south, don't it?

A. Not after leaving the K. K. It turns off some distance out, and then turns to the south.

Q. It runs just above the croppings of the Jackson?

A. Yes, sir.

Q. Are not the croppings at the Jackson nearly due south from the K. K. shaft?

A. The croppings at the Jackson are not nearly south from the K. K. shaft.

167 Q. How much do they lack of it?

A. They are nearer east than they are south.

Q. Have you ever traced the quartzite on the south from the Jackson?

A. I have not for any great distance.

Q. I understand you to say that you think that limestone that is stratified is an indication that it is not contained in any lode.

A. I do not think I said so.

Q. As I understood you, one of the reasons that you gave for believing that the limestone lying between the quartzite and the shale was a lode, was that inside of the shale and quartzite the limestone was unstratified, while outside it was stratified in places?

A. You are correct in that.

Q. Now, if you found stratified limestone within a lode, would it change your opinion as to whether this is a lode or not?

A. It would not.

Q. Why not?

A. Because I find a great belt there of unstratified limestone, containing ore in places, from wall to wall; and if I should find a small amount of unstratified limestone, it would not change my opinion as to that being a lode.

Q. You only find a small portion in other stratified limestone outside, do you?

A. Yes, sir; I do.

Q. Where?

A. Down at this point here [showing]. And I have not examined particularly outside of the vein. A great deal outside is

not exposed; and there have been but few drifts run into the limestone from the various mines.

168 Q. There is a drift running into the limestone just about there; is not there, near the Ruby tunnel?

A. Yes, sir.

Q. That is all outside the shale, isn't it?

A. Yes, sir.

Q. Does that show a single trace of stratification?

A. None that I saw or remember.

Q. Does the surface of the hill to the northeast of the shale show a trace of stratification at any point? I mean in Ruby Hill, now.

A. Not that I remember of.

Q. Do you recollect a cropping just south of the K. K. croppings, or on the south of the K. K. croppings, just above the road, upon which some work has been done?

A. I remember a cropping near the Marcelina shaft. Is that it?

Q. No, sir; it is up on the hill there; up above the roads, up above the roads that run around Ruby Hill.

A. I remember the Carson croppings.

Q. There has been some work done on them?

A. Yes, sir.

Q. Did you ever notice them particularly?

A. No, sir.

Q. Did you ever notice the limestone there particularly?

A. No, sir.

Q. That is inside the shale, is not it?

A. I could not tell you whether it is or not, because I have not examined it sufficiently.

Q. It is within 30 feet of the quartzite, is not it?

A. No, sir; I think it is a greater distance from the quartzite—a much greater distance.

Q. Are you sure about that?

169 A. I feel quite sure without making an examination of the ground. I don't think it is within 150 feet of the quartzite.

Q. There is a road that is cut along the hill side that is not used at the present time?

A. Yes, sir.

Q. That shows the rock plainly running along the hill-side?

A. Yes, sir.

Q. You can stand on the road down below and tell the character of the rock cut by the road above, can't you?

A. Yes, sir.

Q. Haven't you walked along and looked at that rock frequently?

A. I have. I have been upon that road in places.

Q. Will you say that the quartzite don't come within 30 feet of the croppings of the Carson at that point?

A. I say I don't believe it comes within 150 feet of it.

Q. Is there not a belt of plainly stratified limestone immediately overlaying that ore and running to the south towards the Jackson?

A. I don't believe there is a stratified belt within the walls of that ledge running over towards the Jackson. I have never seen it.

Q. Is there or not? Do you know a plainly stratified bed of limestone running south towards the Jackson croppings, or southeast from the Carson croppings, that you can walk right along for perhaps 200 feet on the surface?

A. I don't believe that there is; and if I did see it I should think that it was outside of the shale until developments had shown me it was inside.

170 Q. Do you recollect some little houses that are built up in the ravine to the right of the road that comes down towards the Jackson from Ruby Hill?

A. Yes, sir.

Q. Do you know of a tunnel that runs in behind one of those houses there?

A. I know of a tunnel I have mentioned in my testimony as the Jackson tunnel; that runs in back of these houses that are to the right of the road as you come down near the Jackson.

Q. Do you remember the tunnel that cuts first through the shale and then through this belt of unstratified limestone into or towards the quartzite?

A. Where is the tunnel you refer to?

Q. It is between the outcrop of the Carson and the Phœnix shale, a little more than half-way; a little lower than the Phœnix works.

A. I don't remember any such tunnel.

Q. If that tunnel does cut the shale, first running at the southwest, and then through the stratified limestone, you would conclude that that stratified limestone was inside the shale?

A. If I found no other shale between that and the quartzite, I should so conclude; but there is in the Jackson mine there, where the first body of shale comes almost up to the quartzite.

Q. I am not talking about the Jackson mine.

A. You are talking of a point near the Jackson mine.

Q. Where does the Jackson mine shale appear on the surface?

A. I have never seen it on the surface.

Q. What shale is it that is found where the excavation is made for the Jackson hoisting works?

171 A. That is another body of shale; and not the hanging wall of the ledge.

Q. At what points is what you call the hanging wall exposed on the surface and underneath.

A. In the Bell shaft, in the Utah tunnel.

Q. It is exposed in the Bell shaft, is it?

A. Yes, sir.

Q. What length of it is exposed there?

A. Only the width of the tunnel; perhaps four or five feet.

Q. And what depth of it?

A. As the tunnel runs through it; six or seven feet in height.

Q. Does it resemble the shale that is found in the Richmond and on the Eureka 10th level?

A. I can see no difference.

Q. Does it resemble the clay that is found in the K. K?

A. I can see no difference.

Q. You find that shale at what is called the Utah incline and tunnel?

A. Yes, sir.

Q. That is only a few feet from the Bell shaft tunnel?

A. Yes, sir.

Q. What length of the clay is exposed in the Utah tunnel inclines?

A. I think only about five or six feet.

Q. And what depth?

A. Perhaps 40 or 40 feet.

Q. Where is the nearest point to the Bell shaft and Utah shaft at which the shale is exposed in any of these works?

A. At the 9th level of the Eureka Consolidated.

172 Q. What distance is it from the Utah to the Bell shafts to where it is exposed in the 9th level of the Eureka Consolidated, perpendicularly?

A. About 7 feet; horizontally, 307 feet.

Q. The distance in the straight line between the two, then, would be about what?

A. The hypothenuse of that.

Q. About 800 feet?

A. Yes, sir.

Q. What is the course of the shale in the Bell shaft tunnel?

A. About south 60 degrees, east magnetic.

Q. And what is its course in the Utah?

A. About the same.

Q. What is its course on the 9th level of the Eureka?

A. About south 80 degrees. I speak from memory.

Q. They differ, then, in their course?

A. They do.

Q. What is the dip at the Bell shaft tunnel?

A. About 70 degrees.

Q. What is the dip in the 9th level of the Eureka?

A. About 80 degrees. It dips steeper in the 10th level of the Eureka than it does in the Bell shaft tunnel.

Q. Then from an exposure of the clay seam of about 5 or 6 feet in the Bell shaft tunnel, and about 4 or 5 feet in length and 30 feet in depth in the Utah tunnel, you conclude that it must extend 800 feet down, and adjoin the shale that is found in the Eureka mine?

A. No, sir; but I conclude from the developments made in the K. K. mine, and at other points where they have run it; and it has never struck the hanging wall; and the developments in the Eureka

Consolidated and in the Richmond mine, without striking a
173 hanging wall. It is also found in the Bell shaft; and it has always been found continuous, without a break; and I conclude that those two are the same.

Q. What is the nearest point from the Bell shaft tunnel to where they have struck what you call the hanging wall in the K. K?

A. 750 feet.

Q. It is 750 feet to the K. K., and 800 feet to where it is struck in the Eureka, and still further to where it is struck in the Richmond. Yet you conclude that because there is a little exposure of clay up there, as I understand you, only a few inches in thickness, that it is the same as the clay struck in the K. K., and the shale struck in the Eureka and Richmond?

A. I do not conclude so from that. I conclude from finding the shale there in the Bell shaft tunnel about two feet in thickness; from finding it in the Eureka on the eight-and-a-half level; and from finding it in the tenth level of the Eureka Consolidated about two feet thick; and finding it in the K. K., and almost continuously for 150 feet; also from the tracings in the Richmond mine, on the sixth level, almost continuously for 300 feet; and the Richmond lower works, generally point a distance of 320 feet, and another of 140 feet.

Q. You have already admitted that that is the same shale as this?

A. I have. That last distance, 140 feet, was on a small strip of shale. But in no place that I have ever known, from this development in the Richmond to the furtherest development of the K. K., and in the developments of this country, has there been a break on the shale.

Q. What do you mean by that? You find a clay seam at certain points?

174 A. Yes, sir.

Q. And at other points you find unmistakable shale?

A. I do.

Q. In the Richmond and the Eureka down here it is an unmistakable shale of many feet in thickness?

A. In some places it is thin. It is thin in the K. K. in some places.

Q. I am talking about the Richmond and Eureka on the 10th level, now. The shale there is unmistakable and of many feet in thickness, isn't it?

A. Not many feet. In the Eureka about two or three feet in places.

Q. Have they ever gone through it on the 10th level of the Eureka?

A. I think they have at the end of the 10th level. I am not sure of it; but that is my impression.

Q. Then you cannot be positive that the thickness has been determined on the 10th level of the Eureka?

A. I cannot be positive.

Q. But in the Richmond you do know that it is very many feet in thickness?

A. It is.

Q. You know that in the Bell shaft tunnel and in the Utah it is very thin?

A. About a couple of feet, in my recollection.

Q. Isn't it a fact that there is about a half or a quarter of an inch of clay lying on a smooth wall on the Bell shaft tunnel and also in the Utah; and that above that is a mass of crushed limestone?

A. In the Bell shaft tunnel the clay seam is more than one and a half feet in thickness.

Q. Is the clay more than an inch in thickness?

A. Yes, sir. What I call the clay shale there is one and a half feet in thickness.

175 Q. Do you know whether it is clay or not?

A. I call it clay.

Q. There is a very simple method of determining it, isn't there? Did you take any acid there to determine whether that was lime or clay?

A. It is easy enough to tell from the feeling and its appearance.

Q. Those are all of your reasons for believing that the short space of a seam shown in the Utah and Bell shaft tunnels is the same clay or shale that is found down in the lower workings of the seventh level of the Richmond?

A. And an additional reason is, that in going through the quartzite to this bed of shale, no seam of clay has been found in the workings before, that I know of.

Q. Has any been in the Skylark shaft?

A. I think not.

Q. The Skylark would cut it off, if there had been any?

A. It would, at the depth.

Q. Did not the Skylark drift go in under the shaft there?

A. No, sir; the Skylark shaft lays near the letter "A" in the word "and" of the title; and the Skylark shaft is not deep enough yet to strike the hanging wall.

Q. Did you find the clay on the surface at any other points on the southern slope of the hill than at the Utah?

A. I did not.

Q. You did not examine down towards the Richmond itself?

A. Down towards the Richmond itself, there is some shale there.

176 Q. Is that the same shale that you found in the Utah?

A. I could not say positively, but I think it is.

Q. Give me the course from the southwest edge of the shale above

the Richmond shaft through the Utah and Bell shaft tunnels, and on towards the Lawton shaft.

A. I could only give it to you approximately without a protractor.

Q. You can give it to me on the map. You know about where the edge is.

A. It is about here [showing], about southeast; but I can't give you the exact course.

Q. Continue the line and tell me where it would come with reference to the Lawton shaft.

A. It would come to the south of the Lawton shaft.

Q. Then it would come up hill from the Lawton shaft?

A. Yes, sir.

Q. And the Lawton shaft would be outside of the lode, as you call it?

A. Providing it kept its course, which it does not.

Q. How do you know?

A. Because the Lawton shaft would have cut through it.

Q. Do you know that it did not cut through?

A. I do not think it did.

Q. Do you know it?

A. No, sir; but the drifts and the tunnels running from the Lawton shaft would have shown it if it had cut through it.

Q. Don't you know that the bodies of shale and limestone that are found, particularly the shale, thins out, both as you go down upon them, and as you pass along there?

177 A. They may thin out in places; but I have never known this to thin out, and I have known it prospected for hundreds of feet.

Q. That would seem that it was lost altogether?

A. No, sir.

Q. It ought to pass up through the Lawton shaft?

A. It has changed its course.

Q. How do you know?

A. There have been developments of the drifts and tunnels that would have shown it if it had not changed its course.

Q. The drifts and tunnels would not show that they had not thinned out, would they?

A. They have shown that it has not thinned out.

Q. Have you ever examined a number of holes that have been sunk by the Richmond company, running towards the Lawton shaft from the Utah and Bell shaft tunnel and running in this direction towards the Richmond shaft, on the line of that clay seam?

A. I have not examined those.

Q. You saw that holes had been sunk there, didn't you?

A. No, sir.

Q. Can you say now that those holes that have been sunk along the hill side do not show that it has thinned out and is lost?

A. I could not swear that these holes on the surface do not, because I have never seen those holes; I do not know what is in them; but the underground developments show that it has not thinned out.

Q. In what way do they show it?

A. They follow it and show its thickness, and it is then developed in the Richmond, the Eureka, the K. K., and the Jackson mines.

Q. How do you know?

178 A. I think it is the same seam.

Q. There are 700 feet of distance between those points of development which you find here, and where you find what you call the clay seam in the K. K?

A. Yes, sir.

Q. The clay seam in the K. K. does not have the same course that the clay seam does that you find in the Bell shaft tunnel, does it?

A. It does not.

Q. And yet you say that those are the same and you believe they are the same, notwithstanding there has been no other development in order to show it?

A. I say that I believe they are the same, because it has been developed for hundreds of feet. It is the first clay seam that has been found not running into the quartzite and the shale, where it has always been nearly in position wherever found; and I don't believe that a change in the course of it is impossible. I believe that it does change its course in places, and I know that it does.

Q. You do not know whether or not it is a common thing in limestones to find interpolated bodies of shale in every direction?

A. I know it is a very uncommon thing on Ruby Hill, because none of them have ever been found to thin out.

Q. Do you know whether or not it is a common thing for that to occur in limestone countries?

A. No, sir; I do not.

[Here the court takes a recess.]

179 Mr. Thornton.—Q. What is the wall of a lode?

A. The boundaries of the ore-bodies and lode matter.

Q. What are the characteristics of a wall or walls?

A. I don't know that a wall has any peculiar characteristics, except that it is at times between two formations, and is sometimes a smooth surface.

Q. Walls very frequently have a smooth surface, and show marks of motion on the face of the surface, do they not?

A. They do.

Q. Where you find a smooth surface descending into the earth for hundreds of feet, with marks of motion on the face of it, and ore laying upon it, what would you call it?

A. It is owing to circumstances. If ore was on both sides of it, I would call it a slip or a break.

Q. Why so?

A. We would not call it the wall of a ledge, because there is ore on both sides.

Q. Don't you always find ore on both sides of the wall of a ledge? Do you not know of any case in which ore is found on both sides of the wall?

A. In a great many cases.

Q. In what case?

A. In case of the main ledge running throughout Treasure Hill. There is no ore after you pass the foot wall in the ledge.

Q. What lode is that?

A. The Eberhardt and the Lawler.

Q. There is no ore after you pass the foot wall of the ledge?

A. There is no ore after you pass the foot wall of the ledge?

180 Q. Did not Judge Beatty decide the Early and the Aurora case upon the ground that he found ore five or six feet below the foot wall of the ledge?

A. I don't know about Judge Beatty's decision in that case. I know they have prospected in the foot wall in a great many cases along the line of the ledge and under the surface of the ground; below the surface disturbances they have found ore beyond the foot wall of the ledge.

Q. Is it not one of the points of distinguishing between what is called a bed or body vein and other kinds of ore deposits, that in the one you never find ore extending either into the foot or hanging wall, while in the others you do find ore extending into the foot or hanging wall?

A. I don't know that I have ever seen a body vein.

Q. Do you understand what a bed vein is, or a body vein?

A. I do not, sir.

Q. Well, if the quartzite was let down under the bed of the ocean, or let down no matter where, and upon the quartzite a bed of ore had been let down, and then upon the bed of ore the limestone had been let down, the ore would have been what is called—I forget whether it is a bed or body vein; one of the two. Now, then, one of the modes of distinguishing that is that it is impossible for branches of ore to extend into quartzite, because the quartzite is let down solid before the ore is let down. And it would be impossible for branches of the ore to extend into the limestone, because that is let down after the ore is let down, but with proper veins of ore, filled in between the strata, or in fissures that come through the strata, almost universally they find stringers and

181 bodies of ore running off into both the foot and hanging wall. Now, haven't you seen that occur very frequently in mines that you have been acquainted with?

A. Not in any mines that I know of.

Q. You have not?
A. No.
Q. Do you know what is called the spurs?
A. I do.
Q. Did you ever see any spur?
A. Very few; I can't call any to mind except some in the Austin mines.
Q. What is a spur?
A. A spur is a branch leading off from the vein.
Q. Then it passes through either the foot or hanging wall?
A. It does.
Q. Then the ore or spur is found either in the hanging or foot wall, away from the vein, is it not?
A. I always considered a spur a branch of the lead with a separate foot or hanging wall.
Q. Spurs frequently do not extend more than three or four or five feet away from the vein, do they?
A. I don't know of any spurs of that distance. I would call a spur a branch of the ledge extending off.
Q. Do you know what miners call stringers or leaders of ore?
A. Yes, sir.
Q. What are they?
A. Ore extending into the vein away from the vein [main?] body.
Q. A stringer or leader is ore extending out of one wall, isn't it?
A. I have always understood a stringer to be a small body of ore connecting with the main body of ore, generally leading into it.
182 Q. Does it descend or extend into either one of the walls of the lode?
A. I don't think it does.
Q. You don't think it does?
A. No, sir.
Q. You don't think a stringer extends into one wall?
A. No.
Q. Well, you do find a fissure in the Richmond workings extending for hundreds of feet in depth, do you not, with smooth walls and marks upon the surface of the walls?
A. I wont say that I found it extending for hundreds of feet in depth; the same fissure.
Q. No matter whether it was the same or not. Do you find a fissure or series of fissures?
A. I find fissures all through the limestone of their ledge.
Q. Don't you find one or more fissures extending for hundreds of feet in depth in the Richmond mine, with smooth faces and with marks of motion upon the face?
A. I have found such.
Q. Don't you find the ore laying on those fissures?
A. I have found it laying on the fissures and on both sides of it.

Q. How often have you ever found it laying on both sides?

A. I have found it, I think, wherever I found the fissures in the vicinity of the ore-bed.

Q. Tell me a single point. Point it out on the map, a single point where you have ever found ore lying there below the foot wall or below the hanging wall in the Richmond mine.

183 A. You speak of the ore extending both sides of the fissure. I have found it at 3 C and 3 A; between 3 C and 3 A, on the third level of the Richmond mine.

Q. Where else did you ever find it?

A. I have found it in places in the Eureka mine.

Q. I am talking of the Richmond mine. What other place have you found it?

A. I can't tell of any other place.

Q. Now, as a matter of fact, at the place you speak of, there are two fissures, are there not?

A. There are several fissures there.

Q. There are two fissures that run parallel with each other, are there not? Have you ever found any ore below the lower wall of the fissure?

A. I have. It was a lower wall fissure that I spoke of.

Q. Did you find it all the way between the points you have designated?

A. I did not. It was not opened all the way. It was merely opened to the face; and in one or two places that face had been cut into. Where it was cut into there was ore.

Q. For what distance did the ore extend into the wall?

A. As far as the wall went; perhaps a foot. And there was ore in the face of the excavation that had been made.

Q. Then you think that is not a wall vein, because you found ore extending into the wall about a foot?

A. I think that that is not a wall vein, because I found ore on both sides of it.

Q. Well, you found it extending into it about a foot, I understand?

A. About a foot.

Q. And for that reason you think it is not a vein?

184 A. There is ore at the end of it, and it had the appearance of being continuous for some short distance anyway.

Q. You are acquainted with the White Pine District as well as the Eureka?

A. I am, sir.

Q. The mines of both are situated in limestone?

A. They are.

Q. Do they differ in many respects from mines found in other formations?

A. I have never seen any hanging wall to a mine found on Treasure Hill.

Q. Wont you answer my question, please? Do the mines in the

limestone of Treasure Hill and of Eureka differ in any respect from the mines found in other formations, such as granite, slate, and quartzite?

A. I think they do.

Q. In what respect?

A. They are much larger.

Q. Any other?

A. The gang of ore found in all the ledges that I have ever seen, or can remember of, in granite or slate, is quartz.

Q. Do they differ in any other respect?

A. None that I can remember of.

Q. Do they differ in regularity of form, or irregularity?

A. They are, I think, as regular as other ledges.

Q. Are they as regular as the ledges at Austin?

A. I think they are more regular than the ledges at Austin.

Q. The ledges at Austin have a hanging wall and a foot wall, have they not?

A. They have.

Q. No mistaking it?

A. No, sir.

185 Q. Do the ledges on Treasure Hill have any hanging wall?

A. They have no hanging wall that I have ever seen.

Q. The ledges of Austin are tolerably uniform in thickness, are they not?

A. They vary in thickness. None of them are very wide. Sometimes they are very narrow; sometimes merely a seam.

Q. What is the variation?

A. They are, I should think, less than an inch, to several feet?

Q. How many feet?

A. Three or four feet; five feet would be very wide.

Q. How is it on Treasure Hill?

A. The main ledge running through Treasure Hill has a foot wall, with ore lying to the east of that foot wall, and in some places I should think it was over a hundred feet in width—the ore.

Q. How is it in others?

A. In below Treasure Hill, down on what they call Base Range—

Q. [Interrupting]. I speak now of the Eberhardt and Aurora; or, not the Eberhardt, because that is an east and west claim, but the Aurora.

A. I have described the Aurora.

Q. The Aurora has a foot wall. It has no hanging seam. Now what is the width of the ore-bodies of the Aurora?

A. They will run from 100 feet in width down to several feet in width.

Q. They are much more irregular in form than the lodes in Austin, are they not?

A. The foot wall is more regular; but the foot wall in Austin—it has no hanging wall.

186 Q. I speak of the lode now, not of the wall.

A. I cannot say that the lodes are more irregular than the lodes in Austin, except as to the width of the ore. There it is much more irregular. The boundary or west wall of the lode is much more irregular.

Q. Well, I understand you to say, then, that mines situated in the limestone of the Eureka District, and of the White Pine, are more regular than the mines of Austin?

A. I think they are more regular. They are not broken in depth, and the Austin mines are broken in depth by slips that cut them off, and the ledge is lost entirely.

Q. It is the slips that make them more irregular; or the faulting of the lodes?

A. The faulting of the lodes; and then they are crossed.

Q. There is no faulting at Eureka?

A. There is no break that cuts the ledge off entirely, that I have seen. There are breaks through the ledge, but none that I have ever seen breaking through the quartzite or hanging wall.

Q. I understand you to say that no clay was found in any fissure of the Richmond mine, except the clay in this fissure at the fissure between 7 H and 7 G on the 7th level of the Richmond?

A. No clay has been found that I have seen in the Richmond mine between the point 7 G and the foot wall.

Q. Do any bodies in the Richmond mine rest on quartzite?

A. They do.

Q. Where?

A. The Potts chamber runs back to the quartzite.

Q. You made affidavit in this case?

187 A. I did.

Q. You filed some sectional maps of cross-sections with your affidavit?

A. Yes, sir.

Q. Are those cross-sections correct?

A. Nearly correct. The ore-chamber I have not got in the survey.

Q. You show a single ore-chamber or ore-body in there, of the five cross-sections commencing at this point and extending 500 feet in that direction on the Richmond, that rests on the quartzite?

A. I don't know that I did.

Q. Don't you know that you did?

A. My recollection is that I did not.

Q. Did not you show in those cross-sections the ore-bodies in the Richmond as about half-way between the quartzite and shale in nearly every instance?

A. I think I did. With the exception of the Potts chamber it extends almost back to the quartzite, I think. I would like to state

here that one portion of the mine at the time I made those sections I had never been in, and that is the portion where the Potts chamber runs back to the quartzite wall.

Q. Do you say now that it runs back to the quartzite wall, or that it runs almost back?

A. I say that ore is found here almost to the quartzite wall, if not quite on it.

Q. Mr. Read, suppose that we have two pipe veins—do you know what a pipe vein is, sir?

A. I do not, sir.

Q. Suppose we have two pipes or chimneys of ore extending into the earth in a northeasterly direction, parallel with each other, and you should make a cross-section extending for 1,700 feet
188 along those pipes, not run upon the dip of the pipes, but diagonally across the dip of the pipes, the result would be that you would show ore-bodies in the top of your cross-section at a certain place and ore-bodies in the other place at the bottom of your cross-section, and no ore-bodies until in the top of the other points?

A. That is correct.

Q. Now, that is precisely what your cross-sections show in this, is it not?

A. No, sir.

Q. Those cross-sections show that in some of that ground there are ore-bodies at the top of what you call the lode and none at the bottom, and that in other portions there is ore in the bottom and none in the top.

A. Those cross-sections show the bodies of ore wherever they are intersected. The body of ore that is intersected near the top of those few faults along there is the same body of ore as this marked "ore-chamber," and comes around in the Lookout.

Q. Have you ever drawn a cross-section of the dip of this Richmond lode that would have shown ore the whole of the way down?

A. I think not, sir. I think there are some barren places down from the third level to the fourth.

Q. Well, you went down some of the winzes from the second to the third and from the third to the fourth, off into the west or northwest of the caved ground, didn't you?

A. To the southeast of it.

Q. Isn't there ore in the winzes to the southeast of the caved ground; the winzes that have just been sunk?

A. Those new winzes? I have never been down there.

189 Q. Then you don't know whether there is or not?

A. No, sir.

Q. Well, sir, with the exception, then, of the little space of ground between the third and the fourth level, in which you have never seen ore in passing down through the workings, would you

; but t
have ore from the croppings cle an to the bottom in the cross-
section?
ow, no
A. I would. lodes
Q. Why didn't you mark your width cross-section of your mine in that
way on the dip of the lode, inst or w ead of diagonally across the dip of
the lode?
A. Because, in making my to say cross-sections, I made them in what
I supposed to be nearly right Distric angles to the line of the ledge; right
angles to the course of the le of Au lge.
Q. Well, you knew the dip ular of the lode in the Richmond, did you
not?
roken
A. I had never, up to the rely. at time, seen the foot wall at any point
in the Richmond mine abo e th ve the seventh level.
Q. You found the ore a t the top near the line of the Tip-Top in
the Richmond?
odes
A. I did. g at
Q. How is it; is there nat or was there any ore in the croppings from
the line of the Tip-Top thr and Richmond nearly the entire distance
down to the lower wor igh ks?
A. I believe there is to s ore all the way, with the exception of one
point between the 3d, ex and 4th levels, and from the 2d to the 3d
level?
on
Q. Well, that there f shows the dip of the ore-body, doesn't it?
A. It does. nt
Q. Then if a cros in ss-section was drawn on the dip of the ore-body,
it would sh ow ore nearly all the way down?
A. Nea dly all the way down.
190 Q. But ram as it is drawn now, it shows ore all the way down;
the sections take m n together?
A. The sectio ns are intended to be taken together, and not as
one piece.
Q. Was the a f model made from these sections?
A. The mo lel was made from these sections, and accords with
them.
Q. These sor e ections should be corrected, as you intend to correct
the model.
A. They s w hould, I suppose. If you want them corrected, I will
correct the ti for you.
Q. Mr. Hig ead, how often had you surveyed the 9th level of the Eu-
reka mine before you testified in February or March last.
A. I wo ld not say. I had surveyed it perhaps once a month.
Sometime ys I would not go down for six weeks.
Q. The you have no idea how many times you have made sur-
veys of it a ave not, sir.
A. I h lozen times?
Q. A should think a dozen times.
A. I s

Q. How often had you examined it before you testified in the other case, with reference to testifying?

A. I had never examined it critically.

Q. You had never examined it critically?

A. No; only as I would make my surveys.

Q. How often have you examined it since you testified in that case?

A. I have examined it 3 or 4 times, perhaps oftener.

Q. How wide is the limestone on the surface between the so-callec shale of the Richmond shaft and the quartzite to the southwest of it, measuring at right angles with the course of the crossing?

191 A. I could not tell you without plotting down my surveys that I made there.

Q. Can't you tell immediately about how wide it is?

A. I would give you a rough approximate. I should think about a thousand feet.

Q. About 800 feet at the Bell shaft tunnel?

A. Yes, sir.

Q. Who was it that gave the information to you upon which you wrote this report on the Lookout claim?

A. I can't remember.

Q. Was it Mr. Keyes?

A. No, sir.

Q. Who was the superintendent of the Eureka mine at that time?

A. I think Mr. Keyes was.

Q. Mr. Keyes employed you to make the surveys and examination?

A. He did.

Q. You cannot recollect whether it was Mr. Keyes told you whether that was corraline limestone or not?

A. I cannot.

Q. You don't recollect whether he told you that of lead was found on the surface at a number of points on the claim?

A. I do not.

Q. You don't recollect whether he told you that the bed of the limestone was nearly horizontal there, or not?

A. I do not, sir. My impression is that I got that report from Mr. Clayton.

Q. From whom?

A. Prof. Clayton. I will not be positive on that point.

192 Q. Do you recollect the date at which your report was made on the Lookout?

A. I do not, sir. It was before 1872.

Q. That was one of the earliest claims patented by the Eureka, was it not?

A. It was one of the early Eureka claims patented, but not the earliest. I can find the date if you will let me have the opportuni

Q. Well, you made a survey for the company for the Savage mine, did you?

A. I did.

Q. That was made in March, 1871?

A. That was made about that time.

Q. Or was it in July? The Savage is the southwest claim. Did you report that the lode was through the center of that claim?

A. I don't remember what my report was.

Q. Did you report, or do you recollect, that the claim embraced 50 feet on each side of the lode?

A. I think the claim embraced 50 feet on each side of the lode. That is my recollection; what the report was I do not know.

Q. Well, you reported on all, or nearly all, of those mines for which the Eureka company has acquired a patent, did you not?

A. Nearly. I reported on the Champion, the Buckeye, the Mammoth, the Sentinel, and the Savage.

Q. Well, you reported that the lode ran through the center of the claim, did you?

A. I did.

Q. You reported that the claims were in corraline limestone, did you not?

A. I think I did.

Q. And that the body of limestone was nearly horizontal?

193 A. That was my recollection. I generally copied one report from the other.

Mr. Thornton.—Did you testify that there was any quartzite to be found to the north from the one hanging wall which you have testified to?

A. There is quartzite at a long distance away.

Q. How far off is it?

A. About a mile.

Q. The nearest quartzite that you knew of, then, is a mile from the one hanging wall that is on the north of the lead?

A. About a mile.

Q. Is there any difference in the appearance between the quartzite used for flux, as you have described it as taken from these two mines, and the one found in the ore?

A. A very great difference.

Q. Could you tell the difference easily by the eye?

A. I could,

Q. Is there or is there not the same amount of ore in the quartzite that there is in the vein?

A. The ore in the quartzite is different from that in the vein.

Q. When you testified before in this case and filed the affidavit which contained the sections from which the model was made, did you represent the workings as they then stood?

A. I did, as nearly as I could get them.

Q. Have there been any additional developments since that time?

A. There have been additional developments, and I have also made examinations that I had not made before; for instance, the foot wall at the bottom of the working of the Eureka shaft.

Q. Did you or not know this before?

194 A. I did not.

Q. Had this Potts chamber ore-body been connected with the quartzite foot wall at the point "69 R," when you testified before?

A. Not that I know of. That was the point of the mine that I had never examined at that time; and I knew there was some workings at that point, but we could not find it.

Q. You have been since then to look at that place, have you?

A. I have.

Q. You cannot tell when that drift was run that made that connection?

A. I cannot.

Q. Did you read any number of the affidavits of the defendant which were filed on the injunction bond in this case a statement of one of them that the connection at "69 R" was made?

A. I did not.

Q. Have you not read these affidavits?

A. I have not.

Q. Can you point out upon the map and name the workings which have been run since you testified before, or gave your affidavit rather, since you gave your affidavit with the sections?

A. The level marked 35 feet above the 6th level; the 6th level has been continued. There have been new developments on the 7th level. The 8th level has been continued and the 9th level. Those are the workings of the Richmond Co. Of the Eureka Co. the 3d level, the 5th level, the 7th, 8th, 9th, and 10th levels have been continued, and the level marked "10 D" and "10 E" has been run.

195 Q. Since filing of that affidavit have you been through the levels from the Lawton shaft with several persons to examine for ore and ore stains along those levels?

A. I have, sir.

Q. How often?

A. I have been through the Eureka mine.

Q. Through those levels running west of the shaft?

A. Two or three times; that is all.

Q. Well, if you have changed your testimony relative to the finding of ore, or ore stains on those levels, how have you come to change it?

A. By critical examination of the mine which I had never made before. I stated on the stand before that I had never examined the levels across when I was making my former examination, and I was

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A. By critical examination of the mine which I had never made before. I stated on the stand before that I had never examined the levels across when I was making my former examination, and I was

giving my testimony from impressions that I had received in going through and making my surveys.

Q. State some of the persons you have been down in those levels with?

A. Mr. Keyes, Mr. Donelly, Mr. Moffat, Mr. Forman, Mr. James, and Mr. Smith. I believe that is all.

Q. Have you, since your former testimony, critically examined, with these same parties, the position of the shale at the point where you testified before that it enclosed the stratified limestone?

A. I have.

Q. To what effect was your testimony in answer to the testimony of Mr. Wren that this was a fissure vein; a fissure originally made and subsequently filled up; or did you consider it a lode or ledge of rock in place bearing these minerals, the whole embraced within those walls of quartzite or shale; you did not mean to say that it was one extensive fissure from wall to wall, as first made, and then subsequently filled up with limestone?

196 A. I did not intend to say so. I don't think I did say so.

Mr. Wren.—Q. What did you mean by rock in place bearing minerals?

A. Rock in place is rock that has not been thrown out of position, except by being raised. Rock not in position is all rock that is thrown out of position.

Q. What do you mean by its bearing mineral?

A. By containing mineral.

Q. In what form?

A. In the form of ores.

Q. Isolated deposits found here and there?

A. Isolated deposits here and there through the entire length of the ledge, and in place.

Q. Then your idea, as I understand it from your answers now, is that that is rock in place, with isolated deposits of ore here and there throughout the rock, extending beyond the ore, and occasionally extending from the quartzite to the shale, and occasionally not extending from the quartzite to the shale, and being found occasionally in the limestone and quartzite?

A. That is my meaning, with this exception: that nearly all the bodies that I have of ore found in the mine connect either with the foot wall or the hanging wall of the ledge.

Q. What mine are you speaking of?

A. The Eureka, the Jackson, and the K. K.

Q. The Eureka, the Jackson, and the K. K?

A. The Eureka, the Richmond, and the K. K.

Q. Did you answer me a little while ago, when I was showing you these cross-sections, that this and the other was not a single body of ore shown on these cross-stations.

A. I did not know that the Richmond body of ore rested on

197 the quartzite at that time. I have since found out that it does at one point.

Q. Now, I understood you to say, a short time since, that you did not know whether it rested on the quartzite or not, but that it came very near the quartzite?

A. It is either very near it or immediately upon the quartzite.

Q. For what space?

A. There is no barren space there, I think. My impression is that it rests upon quartzite.

Q. For what space does it rest upon quartzite?

A. That I could not say without examining my notes; for a few feet, 10 or 12 feet, it may rest upon the quartzite, but I have never examined it.

Q. You have shown a large number of lodes of ore in these cross-sections in the Eureka that did not touch quartzite.

A. I have shown several. There are several bodies of ore in the Eureka that do not touch quartzite. Several of them do not touch the hanging wall, but the principal body of ore in the Eureka Consolidated mine rests upon one wall or the other.

Q. I understood you just now, in reference to the ore-body in the Carson, to say that the bodies of ore in the Eureka and K. K. touch the quartzite?

A. I don't think I said so.

Q. You did not intend to say so?

A. I did not intend it, because there are several bodies of ore that are found on but not raised upon either quartzite or shale.

Q. Are there not large ones found but not raised upon the quartzite or shale?

A. I know of no large ones except the surface chambers
198 in the Buckeye or Champion. The Buckeye chambers, I think, can be traced to the quartzite wall.

Q. Do you think the Champion can?

A. I do not know.

Q. Is not the Champion raised up instead of down?

A. If you are down and follow it up.

Q. Don't it run up from the croppings? You have got it so represented on your model. Does not that ore-body from the croppings extend upwards instead of downwards?

A. I don't think it does.

199 SECOND DAY—CONTINUED.

W. S. KEYES, called for plaintiff, sworn.

Mr. Thornton.—Q. Where do you reside, Mr. Keyes?

A. In the city and county of San Francisco, State of California.

Q. What is your occupation?

A. Mining engineer and metallurgist.

Q. Where did you study your profession?

A. At the Royal School of Mines in Freiburg, Saxony.

Q. At what time?

A. In the latter part of 1860.

Q. How long did you remain at Freiburg?

A. Very nearly three years.

Q. What were you engaged in during that time?

A. In the study of chemistry, geology—or, rather, its rudiments—assaying, wet and dry; the working of furnaces generally; I took some lessons in drawing designs, and generally such studies as are preparatory and necessary to the pursuit of mining engineering and metallurgy.

Q. Did you examine mines?

A. I went down once a week into the mines of the District of Freiburg; that was my rule. During the vacation I took trips to the neighboring regions of the mines, simply and solely for the purpose of examining the mines and furnaces of reduction works and concentration works which I might meet in my travels.

Q. After your return to the United States, what did you engage in?

A. I engaged in the practice and pursuit of my profession.
200 I should like to state, however, that before leaving the Academy of Freiburg, I took two courses which are called practical courses, that is, worked as an unpaid employé in the furnaces for several weeks, I don't remember exactly how long, and in the mines for several weeks also. I took there what is called the practical course. I was obliged to perform such labor as is customary for laborers in the mines and furnaces, but only for a short time.

Q. After your return to the United States, what did you engage in?

A. After returning to the United States, in the spring of 1863, until September, I examined superficially—at least, traveled about through the State of California, looking at its gold mines and its copper mines, and then I went over to Washoe, to the city of Virginia. I remained there for some time, and was shown through the various mines by Mr. Palmer, at that time superintendent of the Ophir, and by Mr. Strong, at that time superintendent of the Gould and Curry. These two, I believe, at that time, were the principal mines there. Subsequently, or shortly after that, I went to Mexico, and remained there about two years, I think.

Q. Engaged how?

A. Engaged also in the practice of my profession, as mining engineer and metallurgist. I returned to San Francisco, I think, during that interval once, and went back again to Mexico once. Then I remained in San Francisco for six or eight months; I do not now remember exactly how long; then I went to Montana in charge of smelting mines belonging to the St. Louis and Montana

Mining Co. I remained in Montana in the practice of my profession, I suppose a little more than two years; thence I
201 went to New York for a short trip, and returned then to White Pine, or at least went to White Pine, in Nevada, having charge of the Smelting Works of the White Pine Smelting Co. From that time to the present I have remained in that vicinity of eastern Nevada, except during occasional trips that I have made to Inyo county and other places.

Q. For what purpose?

A. For examining and reporting on mines.

Q. Did you ever reside in Eureka?

A. I resided in Eureka almost continuously since January 10th, I think was the date, 1870.

Q. What has been your occupation at Eureka?

A. At Eureka I have been engaged in superintending mines.

Q. State what mines.

A. I was superintendent of the Eureka Consolidated mine from the beginning of 1870 for nearly three years. Immediately thereafter I was superintendent of the K. K. I was also in charge of the Phœnix mine adjoining it; also in charge, for several months, of the Hamburg Mining Co. I will state, however, during the last year I was absent from the town of Eureka, as one of the mining and metallurgy bureau at the International Exhibition; and save and except that time, I have almost been constantly at the town of Eureka.

Q. How many years is that then that you have been at Eureka working these mines?

A. I have worked them actually very nearly seven years.

Q. How often during that time have you been underground in the workings of the K. K. and Eureka?

A. On an average at least once a day; sometimes more than once a day.

202 Q. During almost the whole of that period?

A. During almost the whole of that period.

Q. Have you ever examined the surface and underground workings of the Richmond?

A. I have, sir.

Q. When?

A. I can't state how many times, in years gone by and during the present year; critically during the present year.

Q. Are you familiar with the characteristics of the K. K., Eureka Consolidated, and Richmond mines?

A. I think I am thoroughly acquainted with them.

Q. Well, describe them to the court in your own way, Mr. Keyes, with reference to the question as to whether they are upon one and the same lead or not.

A. In order to arrive at a conclusion as regards this point, before stating my conclusion, I should like to state the method of my in-

vestigations and the results—my conclusions rather are the results of my observations for many years past—and I presume the best way to get at the proper conclusion would be, first, to collect facts and see what their bearing is as regards the generally accepted leads, lodes, ledges, or veins, as described in the authorities, and as known by usage and custom, and see wherein the resemblance consists, and name its deposit. I use the word deposit in its widest sense, according to its greatest similarity, as it is more or less similar to any of the well-known characterized veins; and in order to arrive at such conclusions, we will take some slight view of the surroundings, the geology and the rocks which enclose it and are in the vicinity. I might, in other words, start with my belief, and give my reasons for it, but I prefer to draw my conclusions as I go along, from the facts as I have observed them.

203 In the first place, we have a body of quartzite—a deposit of quartzite, whatever you may choose to use—lying on the south side of this Ruby Hill. Immediately on that quartzite we find a metal-bearing zone. Beyond that metal-bearing zone we find what we call a calcareous shale. Its appearance sometimes would indicate that it contained a large amount of argillaceous matter. But I am merely regarding the appearance of the various strata. Beyond this we find the mass of limestone. This would generally describe the first superficial appearances that one would remark on approaching Ruby Hill. To look a little nearer, however—to take the quartzite—we find this quartzite on the surface west of the Jackson mine—the Jackson mine not being represented on this map, but being farther to the south. The quartzite there has a direction more or less northerly and southerly. And as we follow around the quartzite behind the claims, which are noted on this map, we find the quartzite has a greater and greater tendency to run easterly and westerly. As we follow past the line of the Eureka Consolidated we see that the quartzite is far down the hill to the southwest.

Q. Point that out on the map.

A. That is the ground to the southwest [pointing]. We find that its general course is something like the letter S, starting at the south and bellying out and then curving backwards to the northeast, then bellying back again to the southwest, then rising up to the point of conjunction, between the properties of the Eureka Consolidated and of the Richmond Mining Co., forming a wavy surface. From this it flows back again to the southwest of the Richmond. To the southwest of the Eureka Consolidated, we find a small

204 valley; and at a distance, I suppose, of 500 or 600 feet—not very far—we find another hill rising, which is also quartzite. This quartzite continues on southerly towards Spring Valley. This quartzite is underlying in many places, and I presume generally to the south has underlain all the limestone. It will be observed that this is generally the direction of the quartzite, as we see it on the

surface; that is, a change in direction prevails. Its average direction we cannot precisely tell. I merely state it as it is exposed on the surface. We can get a very good idea of the average. Having such a peculiar course, it is natural that the dip should be very variable. We should judge naturally from the surface should be very variable. Underneath the surface, however, we find that this variation in course, although great, is not as great as that on the surface. These same waves form capes or promontories. Naturally, on one side of a cape or promontory, the dip would be directly opposite to what it was on the other side of the cape or promontory. For example, at the very large cape or promontory, passed through at the 9th level, any ore which lay on the eastern side would have a dip to the east, and a course to the northwest and southeast. Any ore lying on the western side of this promontory would have a course northeast and southwest, and a dip to the west—entirely different, in other words. These promontories are observable in a diminished degree as we approach the surface. This same promontory, observable on the 9th level, is smaller on the 8th level, still smaller on the 5th level, and quite small, as you may observe it, on the map, at 3d level; and near the surface in the upper levels, we don't know that it exists at all.

A little west of the point 5 W, 9th level, three or four
205 hundred feet below, it is 210 feet across, whereas, at the 5th level it is only 15 feet across. Such variations, according to my observation in other places, have recently been confirmed by the position of the ore-body found in the 5th level. I believed that where one wave of the foot wall strikes out to the north, a corresponding wave would be found in the foot wall farther on in its course. That that belief was well founded is entirely proven by the position of the ore-body as now found in the end of the 5th level of the Eureka Consolidated. It will be observed that the quartzite, at this point, makes a sharp turn beyond the point 5 F, at the western end of the 5th level, and turns around, running nearly northeast and southwest; whereas, it formerly had been running southeast and northwest. The underlie at the turn forms a bellying or basin into which the ore had settled. I believed that a similar occurrence would be found in depth, for the reason that on the surface, at the point of junction between the Richmond and the Champion, the foot wall is seen waving up where it forms one of these capes or promontories. It is likely to continue down. A later demonstration has proven the correctness of this deduction, which, being carried to its legitimate conclusion, gives rise to just such a state of facts. This quartzite underlying is marked in many places by its smooth deposits of manganese. This manganese varies in thickness from a fraction of an inch up to 20 or 30 feet. The vein in many places shows lines of motion; motion or striation between the two formations. It is smooth, and looks very much

like manganese stains, particularly in the cross-cuts in the
206 Phœnix, not laid down on this map, from which I got a section of the foot wall which I shall be happy to display, and expect to display as soon as we can get our specimens in order. At other places there seems to have intruded a species of clay and feldsparthic material. In fact, it looks very much like clay immediately on the foot wall. I have some specimens of that also. At other places the foot wall is exceedingly soft and decomposed—discolored. And still again at other places it is very hard. It has been cut through in many places. The Jackson mine drove into it a distance of 750 feet. The main shaft of the Phœnix, which is the mine adjoining westerly, was sunk down a distance, I think, of 646 feet; the bottom was in quartzite. Passing beyond each of the three mines delineated upon that map has reached the quartzite. Every shaft that has ever been sunk to a sufficient depth to the north or northeast of the outcrop of the quartzite has reached it and penetrated it. There are several shafts and several prospect holes, you may call them, small ones, and one prominent shaft which has not reached the quartzite. The shaft which has not reached the quartzite is the Skylark. It has considerable distance yet to go. Taking the average dip of the quartzite, it will be necessary for that shaft to proceed several hundred feet in depth before it will reach the underlying quartzite. I think now that I have fully described the various appearances of the quartzite at its point of contact. At the point of contact with the superimposed limestone, we find, frequently, bodies of ore. I shall leave the consideration of the ore until I shall have finished with the rocks. In
many places immediately upon the quartzite we find lime-
207 stone closely impinging. The physical peculiarities of this limestone are many and various. We find—I am describing it as a whole—the zone of limestone between the quartzite and the overhanging shale rarely, if ever, stratified. And before I speak of the other physical peculiarities of this limestone, I should like to state the only place where I have found any similarity to stratified limestone, so that I may not forget it. In the Phœnix claim, close by the quartzite, there is what appears to be stratified limestone. And that is the only place underneath the surface of the ground where I found it. This apparently statified limestone, however, is darkened and muddy-colored, and as soon as you touch it it falls to pieces. It is entirely softened and disintegrated, but still maintaining or retaining an appearance of stratification. Again, on the surface, near the Carson outcrop, there is also an appearance of stratification. With these two exceptions, I know of no place between the quartzite and the overhanging shale where stratified limestone is to be found, and in one of these places it is found hard. In the first place mentioned, underneath the ground, it is entirely soft, disintegrated, and almost muddy. So much for the stratified limestone as found within this zone. Next to the stratified lime-

stone I would mention the compact, hard, limestone. A great deal of this is broken up into huge blocks. Again, we have limestone entirely disintegrated, which appears like sand, and we find this soft, sandy, limestone, either above the ore-bodies or occasionally on the underlying quartzite. I have examples of both. These specimens show the limestone disintegrated. Next, we have shattered limestone like coarsely broken and pulverized glass of all sizes.
208 This shattered limestone runs all the way between the coarse blocks and the very fine sand. I used the word sand not meaning silica, but merely to express the physical appearance of the limestone. The sand appears to be disintegrated limestone, and often gives rise to what the miners call runs. I had what threatened to be a very serious case on one occasion myself. The men were very much frightened. The limestone ran down over the ore-bed, filling up the slope. We have also shattered limestone fastened together by slimy exudation, forming a species of *breccia*. Aside from the simple mechanical changes of form, we have limestone more or less deeply colored by oxide of iron and manganese. The occurrence of the manganese is chiefly on the inner or underlying quartzite. Oxide of iron is found everywhere on the places where it is marked on the map as ore stains. The oxide of iron being the coloring matter. This limestone, discolored to a greater or less degree, forms a guide for the miner as to the position of the ore-bodies. *A priori* it is impossible to say where we shall find them. When I first took charge of the Eureka Consolidated, we had no theories for prospecting for ore. Since that time we have had a definite, and I think, an entirely consistent theory for prospecting for ore-bodies. The results have been satisfactory up to the present, and were I now in charge of those mines, or either of them, I would still continue the same method of prospecting. Wherever we find the ore stains, or stained limestone, we expect sooner or later that they will give place to pay ore; that the ore shall become "*necho*," (a term used by the Spaniards,) made literally or turned to ore. These indications, so to speak, should be observed as we approach a bed of ore. As we approach an ore-body we may find the limestone very much harder before
209 we get to it, or we may find it very much softer. We have examples of both. So if it were very hard I should consider it a very good indication of approach, and if it were very soft, I should consider it likewise a very good indication of approach. In other words, I should consider either extreme a good indication. As we approach the ore-body of the 2d level of the K. K. mine at its eastern extremity at F, we find these different variations. From this point I have brought a number of specimens of limestone. Starting from and immediately on the drift the limestone is very hard. Advancing a little distance you find the limestone shattered—broken up. A little farther it is still more broken up. A little distance farther we get slight ore

stains. A little distance farther we get very heavy ore stains, or exceedingly low-grade ore. *A little further on we get very dark-colored ore.* Very low-grade ore. Then we come into the ore slopes from which pay-ore has been taken. The limestone throughout the zone is remarkable as containing a large number of caves. Some of these are of very considerable extent. I think the caves are more numerous toward the east than toward the west. There is a very large cave in the K. K. mine, second level. This cave is a matter of 70 feet long and about 40 feet high. And there were a series of caves which extended down in a more or less nearly direct course below the fifth level; and at this point below the 5th level, I myself walked into a cave 150 feet, which was 25 or 30 feet across, and I don't know how deep. I could throw a stone down; I should judge at least 30 or forty feet.

In the Eureka Consolidated mine there have been several
210 large caves. The first large cave that was ever found there was in the old works, on the extreme western end of the Champion. It was a large cave filled with beautiful stalactites and arragonites. In fact the arragonites were precisely similar to those found in the cave of the 9th level. And it is fair to suppose that this system of caves formed a vent, as it were, at about that point. We find a large cave near the surface, and we find a large one down toward the bottom. While sinking on the quartzite, we find much of this limestone eroded by water, forming other caves. We find, also, a large cave over the ore-body at the 7th level. From these caves or caverns there are numerous small cavities, and some of them quite small, which might be denominated rugs, containing crystals of lime spar. This limestone is also broken and fissured in an infinity of directions. It is impossible to give their directions. They are all broken to pieces. Once broken their directions are infinite. Aside from this infinity of directions, caused, doubtless, by the breaking, crushing, and rubbing of this limestone, we have two general systems, marking the longer breakages; of these longer breakages, the one extends more or less nearly at right angles with the underlying quartzite, and the other more or less nearly parallel therewith. An exception, however, to both of these directions, and observable only in the Richmond mine, is in the roof of the Lizette tunnel, at some distance in. At this point these breakages appear nearly horizontal, and it is the only place I am aware of, inside of this limestone, where these breakages are thus found nearly horizontal. One of the most prominent of the north and south ones is found west of the shaft at the K. K., 2d level, and extends from the shale to, or nearly
211 to, the underlying quartzite. We find that there are along the line similar breakages at the southeastern portion of the ninth level of the Eureka Consolidated.

Mr. Thornton.—Q. Describe the dimensions of that break before you leave it.

A. In the K. K?

Q. Yes, sir.

A. The cross-break in the limestone in the K. K. mine extends from the overhanging shale, on the one side, quite or nearly to the underlying quartzite on the other. I distinguish as cross-breaks those which run nearly at right angles with the underlying quartzite. These cross-breaks sometimes extend quite to the overhanging shale and sometimes give out. The other system, if system it can be called, is that which runs more or less northwesterly and southeasterly, parallel with the underlying quartzite. And, in my judgment, their direction is due to and governed by the direction of the underlying quartzite, and their occurrence was due to the falling away of the underlying quartzite itself. I believed that this was the mode of their formation; and a few days ago, while examining the Eureka Consolidated mine, I found abundant confirmation of this. The point where my confirmation came strongest was below the 9th level, below the ore-chamber, below 9 T or 9 W. Below that ore-body I had observed in the Richmond where the drifts, two or three months ago had ceased, owing to the restraining order of the court, that there was a tendency to the formation of those breaks perpendicularly, or with a dip towards the foot wall. This is at a point at the extreme southeastern end of the 6th level of the Richmond,
212 and opposite to or to the north of the ore found at the northwest end of the Eureka 9th level, at the end of the Richmond level, beyond 6 L. I take that letter to be where the 47-foot winze goes down; it is not marked on this map, but I take that to be the level, at the end there; after the ore had ceased there was found a break in the limestone extending across the face. This break or apparently smooth wall, looking something like a wall excepting that it had no clay or selvage on it, was simply a fissured face of the limestone with a dip towards the quartzite; that is, backward. The same thing was observable at the notherly end of the ore-body beneath the cave at the end of the Eureka 9th. It seemed as if these breaks in the limestone marked the limit of the ore; and in fact as the ore was sunk upon beneath what is called the ore-chamber, at the northwest end of the Eureka 9th, we found these breakage planes still extending downward. If, now, the quartzite had continued with the same dip, these lines of breakage would have cut off the ore entirely, both from the Eureka on the one side, and from the Richmond on the other. I believe I stated to a certain person, however, that the quartzite would ultimately assume a different dip. We went down this winze 9 T, and we found that the foot wall on the south had actually fallen back and taken the reverse direction, and that the ore had followed it down, and passed on entirely underneath these lines of breakage. And an additional proof that this thing does occur elsewhere was in the Jackson mine, which I visited recently; on the lower level, I think it was. I visited the mine once, and the same fact was specifically to be seen. We found the ore

resting upon the foot wall, upon the quartzite; there the line of breakage in the limestone came down to within a few inches
213 of the quartzite, and ore followed along underneath, precisely in the same way as at this point underneath the Eureka ore-chamber of the 9th. I found those two confirmations of my prediction which I had been able to verify; and these were the legitimate deductions from observations previously made elsewhere. These breakage lines or fractures in the limestone sometimes carry ore and sometimes they do not. The right-angled ones, namely, the ones which extend at right angles to or from the underlying quartzite, carry the ore from the quartzite out for some distance. They do not carry the ore to it, but take the ore from it. This is particularly and plainly observable on the cross-break at the northwesterly end of the K. K second level. Ore was found, extracted, and worked; and when I say ore, I mean pay-ore, good pay-ore was extracted and worked from close by the underlying quartzite until some few feet beyond the shaft. From thence onward the course of the cross-break was entirely barren, having no ore or ore stain, no pay-ore, nothing whatever. Of those running in a contrary direction and more or less parallel with the underlying quartzite, some carried ore and others did not, and the ore is found both above them and below them. All of these breakages, without exception, are confined to the body of limestone bounded on the one side by the quartzite, and on the other by the shale, and have not yet been known to cut the shale, however thin it may have been. I should have mentioned in the beginning that we have a shale to the north of the limestone. It was a matter I was so familiar with that I forgot it. We have two shales, one a thin one and the other a very large one. But however thin this shale may be it has never yet been known to be penetrated by one of these cross-breaks.

214 Mr. Thornton.—Q. When you speak of two shales what do you mean?

A. I mean the very thin seam which bounds the ore.

Mr. Wren.—Q. Do you mean two lines of shale?

A. I do; yes, sir. Whether they come together or not is a question I have not yet touched upon. It has been customary here to speak of two shales. I have no objection to stating that of the one is very small and the other is very large.

Mr. Thornton.—Q. Describe where they are.

A. The other shale, the thicker, broader one, is some distance to the north.

Q. Of what?

A. Some distance to the north of the shale which I originally described here.

Q. How far north?

A. It varies, I should judge, from a few feet up to several hun-

dred feet; because, in my judgment, the thinner shale unites at certain portions with the broader one, so that I cannot fix its distance unless you fix the place. This broader, wider shale is entirely calcareous, and is underneath (and by "underneath" I mean not only sunk, but also physically underneath) the stratified limestone which is across the gulch to the north of Ruby Hill. At that point we find stratified limestone with intercalated strata, which appears to be marl. They may be clay on they may be calcareous slate.

Mr. Thornton.—Q. You were remarking when I interrupted you that these fissures, or cracks, of limestone did not extend across the shale.

A. I never have known any instance where they extended
215 across the shale, or through the shale, however thin it might be. To continue with these shales, however, I should have described this when I got to the shale.

Q. Continue with the fractures.

A. These fractures, or planes of fracture, I maintain, are governed entirely by the position of the underlying quartzite and by forces which may have acted upon it. We observe in this zone, then, varied changes of the limestone. We find it waving in various directions. We find certain planes of fracture. We find these planes of fracture not extending beyond certain limits. We find beyond these limits a body of shale, calcareous, or clayey shale, it may appear, and beyond this first shale, where it has been passed, we find in some places stratified limestone, and in other places unstratified limestone. Beyond that, wherever it has been penetrated, we find the grand calcareous shale, which runs to the north. Now, I think I have sufficiently described the shale, although I have taken it a little out of its course. I will now proceed to the description of ore-bodies. The ore-bodies, as we observe them on the surface, are now much larger than they appeared eight years ago. When I first visited the Eureka, in April or May, 1869—April, I think it was, of 1869—there was but very little ore visible on the surface. The Jackson was the great ore-body. Quite an outcrop of ore was visible there; and a small outcrop of ore was visible in the ground of the Phœnix Co., then called the Adams & Farren. At the Drap, a little farther, there was a small outcrop.

At the Parsons, which is a part of the K. K. claims, there was then an opening which remains, I believe, nearly as it was at that time; thence for the rest we find the original outcrop of the old Marcelina claim, on the side of the hill.

216 Mr. Garber.—Q. Where is that on the map?

A. It is not on the map; it is a large outcrop there; it is as broad as from the end of this desk to the wall. It is unaccountably overlooked by Mr. Read. It was so prominent that he probably passed it by. Then further on we find the outcrop at the Sentinel

claim, belonging to the Eureka Consolidated [pointing]; some of these are chambers of the surface belonging to the Sentinel. Then passing along there was quite a small outcrop in what is now the Buckeye. The main outcrop of the ground belonging to the Eureka Consolidated was the Champion, while still further on there was almost an apology for an outcrop at the Richmond. There was a cave in the Richmond there that was stained by oxide of iron—low-grade ore. A man passing on the surface, however, might possibly go beyond it without observing it. This is the point from which since that time such an enormous body of ore has been produced. These outcrops were visible along this lower line On the southerly line of these claims, and a little farther up the hill, there were observable quite a number of outcrops on the ground, which is now marked Sentinel and Mammoth. There were 7 or 8 ore-bodies cropping out at that place. Also, at a point on the Richmond called the iron shaft, there was some little outcrop, and at some minor places we find slight outcroppings. In all, 34 outcrops of greater or less prominence are to be found from the Jackson to the extreme limit of the Richmond. Beyond the Richmond, to the north, there were two outcrops; and beyond the second outcrop, a little further on, another claim and outcrop—I have forgotten the name; May-Day, I think. These 34 outcrops were the only bodies of ore which came to the surface. These ore-bodies have
217 since that time been remarkably enlarged. The original shaft of the Buckeye was very near the point as I recollect it, marked on the map S A, in the surface ore-chamber of the Buckeye. This was quite a small opening and it has been enlarged to several hundred feet in length, with ore the whole distance. The green ore-body to the westerly part of the Buckeye was then entirely unknown. That was underneath the surface, and it looked as if there was a barren zone from the point S A, very nearly over to extreme limit of the surface ore-chamber of the Champion. It has since, however, been found to extend so that it almost connects in ore. In other words, there was a cap of limestone overlying that in that place, which induced one to think that the ore had ended. These ore-bodies were subsequently greatly enlarged by development, and in addition to the ore-bodies that are marked on this map we find two ore-bodies which have been most unaccountably neglected—the one the Nugget ore-body, as it was called, on the quartzite beneath the Champion surface ore-chamber, and the other called the Champion incline ore-body. These chambers may have been closed up. Farther along there were other shafts not laid down, and they also may have been filled up so as to drive over them, as it is quite possible that Mr. Read may not have been aware of it. They reached the quartzite and ore was found upon the quartzite.

I have now described generally the surface ore-bodies extending a greater or less distance down. Of these 34 ore-bodies that we have found on the surface, that at the Jackson did not go down any

distance. And the majority of these ore-bodies found on the surface did not extend downward any great distance. Those on the
the western side of the Eureka Consolidated could not
218 away there, forming a species of basin to the rear or to the
back or southerly side of these ore-bodies, and they are found lying upon it and connected with it. Again, through the Buckeye shaft this is very plainly visible. The Buckeye shaft strikes the quartzite at a depth of 35 or 40 feet, and upon it we find low-grade ore. The quartzite here appears to have a false direction. It dips the wrong way, for the reason that it has fallen over or been eroded near the surface. For this reason the zone of the limestone appears to have such an enormous breadth on the surface, while it has nothing like such a breadth in depth. Of these ore-bodies some of them give out at a few feet in depth; others are continued until they reach quartzite. This ore-body of the Champion, at the surface, we find curved upward, like a thin lenticular-shaped body, or like one of these Prince Rupert's drops, thin at one end and large at the other, with bulbs at the bottom. Some of the ore-bodies at the Buckeye appear to have the same tendency. In other words, they were sympathizing with the direction of the underlying quartzite of the foot wall. As we go down in depth in all the mines, we find that the ore-bodies have a tendency to approach the underlying quartzite. And wherever they have been found, the ore-bodies, almost without exception, have a tendency to approach, and generally have approached, and rested upon the quartzite.

There are two or three instances in which they have not yet been carried to the quartzite, and there are two or three instances in which it is impossible to carry them to the quartzite; for the reason that they have, to all appearances, given out entirely. This is particularly noticeable in an ore-body on the K. K. 3d level,
219 which extends from the thin shale over to the first northerly
branch of the main level.

Mr. Thornton.—Q. At what letter?

A. At the letter 3 B, extending in the form of a bow, and reaching over to and coming down at the point 3 A, into the main drift. This ore-body contained exceptionally rich ore. It is disconnected with any other ore-body, and is underlying or against this thin shale at the north end of the cross-cut. There are other examples of the same occurrence visible at the 3d level of the Eureka. I am not certain about the level. It is immediately over the 7th level; what we call the 7th level bonanza. There was a separate ore-body up there which is physically disconnected with any other ore-body, and over it was a small cave, and I have no doubt those bodies connect, or were due to the same source. It is to be supposed they came from the same source, but owing to the solubility of the limestone, cracks or fissures in the limestone might have been, and probably

were, subsequently filled up with carbonate of lime. These ore-bodies, with but few exceptions, rest upon the underlying quartzite, and those exceptions are isolated bodies which have no connection apparently with the foot wall. The deeper we pursue the ore-bodies the greater is their tendency to hug the underlying quartzite; and, as a rule, the denser and the heavier is the ore upon the quartzite. What we call black carbonate in masses is rarely found except upon the contact at the line of contact between the quartzite and the limestone. There is a very remarkable stratum of this ore extending downward from the 5th level of the Eureka, as traced by
220 winzes, almost in a direct line, sometimes on one side and sometimes on the other side of the line of winzes. On the farther side of this cape or promontory, which we find at the westerly end of these claims, and running clear down to and beneath the ore-chamber at the northwesterly end of the Eureka 9th, and following down through two winzes on or near the quartzite continuously, we found at a certain distance, I take it to be of about 40 feet down this winze perpendicularly, the ore continuing down, after having passed the lowest part of the slopes. I must explain, however, that this ore-body has been sloped out up to the time of the restraining order. After the restraining order had come in force these new developments were desirable, or at least it was desirable to continue the developments, so a winze was sunk from the lowest part of the slopes down to the quartzite, and thence carried on along the quartzite. When I speak of the bottom of the slopes of the 9th, I mean the lowest point of the slopes. There has been no sloping done since the restraining order. Since the injunction or restraining order we have followed down perpendicularly a distance of somewhere about 150 or 160 feet, where we find two little cross-cuts on the foot wall, with ore all the way, good pay-ore at the end of them, and fair middling to good ore the whole distance in both of these cross-cuts immediately on the foot wall. In other words, we find, from some distance above the 5th level, almost exactly on a line, clear down to the bottom, valuable pay-ore the whole distance. On the Richmond, nearly opposite to the point 10 E, there has been a drift run over southerly to intercept, or to head off a drift run by the Eureka Consolidated northerly from a point on the foot wall far down under the cave. And the whole of that drift is in
221 poor low-grade ore. The same thing, in a less degree, however, may be said of the drift extending from the Eureka Consolidated foot wall towards and in the direction of the drift under the Richmond 6th. There is a winze running down from the 6th to the 7th Richmond, from which there is a drift, running off southerly toward the Eureka Consolidated ground. These two have not been connected, but we find ore stains and low-grade ore the whole distance, as far as each has been driven, commencing upon the quartzite and extending very nearly or quite to the overhanging shale at the Richmond 7th. There is also a very remarkable body of ore

at the point we call the 8½ level of the Eureka Consolidated, and in the northeastern slope. This ore is totally different from any ore found in the mine elsewhere. It seems to be very difficult to smelt. It has a great deal of iron pyrites; some galena has been found and probably some nickel, but it is impracticable to work at present. There is a large ore-body lying right in the sag of the promontory and the quartzite. The sag of the quartzite faces northerly, and extends from the point 9 G in the direction of 9 S. The original body of ore, as it was found in the Jackson mine, was of quite large dimensions. It was totally worked out. This large chamber was some 70 feet long and some 85 feet high, and I should judge it must have been 25 or 30 feet across. It formed a lenticular mass near the surface. It was only recently that any additional ore has been found in this mine.

The new shaft sunk under the present direction was started to the north of the old one, and driven down through stratified limestone.

222 It passed then by two levels through stratified limestone until it came to what we call shale, a species of calcareous or clayey shale. It passes through this clayey shale into limestone again, which was totally devoid of stratification, broken up and disintegrated. Thence it passes through into the quartzite. On the quartzite, at the 460-foot level, and extending north for a distance between 200 and 300 feet, I was told 230 feet, there was in many places a stratum of black, heavy carbonate of lead ore resting upon quartzite.

Mr. Wren.—Q. You were told that?

A. I saw it. I was merely told the length—the distance. I saw all of this that I am describing. I saw this ore extending along the quartzite and corresponding in appearance with that found on the Eureka 5th. I have a sample of it. It is identical with the ore found in such abundance from the western part of the 5th level of the Eureka down along the point of contact. And it was the first time I had seen it in the Jackson. In fact I did not know that it had occurred there before. It is merely another evidence of similarity—identical ore in an identical position, in places of 2,600 feet or nearly half a mile apart. In addition to that the Jackson has an isolated body of ore underneath a cave which still further brings it into the line of resemblance with the other mines. This cave was struck running out easterly from the foot wall, and you can go up it a distance, I was told, of 90 feet. I went up myself 15 or 20 feet to satisfy myself that it extended up some distance. I found good ore underneath. The apparent dip of it is nearly straight down. The ore under the cave in the Jackson mine has an apparent dip almost perpendicularly downward, which dip continued would bring it to the quartzite foot wall, a point to which I maintain that all these bodies tend, and where I maintain they all belong.

223 In the next succeeding mine, the Phœnix, there has been so little work done that there is very little to be said about

it. There have been but one or two levels run, and the quartzite is displayed in but two places; shale is not found anywhere. In the K. K., which is the next succeeding mine, we find, as I have mentioned, the two outcrops of the surface, and the third one, which is now covered up with waste, consequently it could not be put down on the map. It appears on the surface immediately above the point marked 1 B. Those are the three prominent outcrops in addition to the Carson, which would make four. Two of these outcrops start away from the contact. The third outcrop starts at the shaft B, which is the shaft a little east of the Marcelina east shaft —the shaft in the gulch. The ore is low-grade iron ore, and lies on, or nearly on, the quartzite, which is largely covered with detritus a little back of it. The quartzite at this point runs very close to shaft B. As we proceed down this line at the 2d level there are very large ore-bodies away from the contact. Immediately on the contact we find a smooth face beneath a cave, this cave that I have already mentioned, and valuable ore. We also find sandy limestone, broken up, with valuable nodules of galena. In every 50 or 60 feet of the same level we find cross-cuts to the large ore-chambers that have been worked out for a very long distance. At the points 2 A, 2 B, 2 C, and 2 D, large ore-chambers have been worked out. Going up into the stopes, we find the body of limestone separating into two branches that we should conclude existed from observing this large Marcelina outcrop on the surface. We find where the ores are branching out as we approach the surface.

224 As we get farther down toward the 3d level and about half way between the 2d and 3d, we find the ore resting immediately on the quartzite, and from this point down to the very deepest part of the mine, with but two single exceptions, which I have already described, at the points 3 B, and the present ore-body at the extreme end of the the 4th, there is no ore found but what is connected with the quartzite. And the present ore-body at the extreme end of the 4th level is dipping and going, as fast as they can follow it, immediately down towards the quartzite foot wall, towards which it falls, and where it will certainly come. Beneath the 6th level the ore is found immediately on the contact; and mingled throughout are large masses of manganese. The 7th level has no ore at all, and none has ever been found there. Some ore stains were found at the extreme end of it, but no ore.

It will be observed that the most of these levels have at least one drift run upon the quartzite. The lower ones (5th, 6th, and 7th) are entirely upon quartzite, and in that way one can see the formation of the underlying rock. It will be observed that a grand basin is formed here, which accounts for the large deposit of ore in these places, as marked on the map. There is a species of basin formed as you go down. The foot wall or underlie sinks down and then turns to the northeast. As you go farther to the northeast, the quartzite waves back again, making a turn towards the southeast

again. The Richmond mine, to the superficial observer, would seem to be in its prevailing features entirely inconsistent with the observations made elsewhere. And it is very easy to understand how it could appear so different. The Richmond, in their explorations, have never sought the underlying quartzite. It is
225 only recently that their ore-body and the progress of their workings, and perhaps the necessities of this case, have induced them to drive over from a point a little above the 6th level, and to cut the quartzite a little beneath the 9th level. They have followed down almost continuously a shoot of ore. This ore is broken in two places. These places are simply connected by a crack—a break in the limestone. These are only subordinate breaks which occur locally and only inside the vein limestone. This drift recently driven from the Richmond mine to connect, carries ore and ore stains from a portion of the Potts chamber into the ore-body beneath the 9th level of the Eureka Consolidated, which is upon the quartzite. It establishes the connection which I had from general observation maintained would be the result, namely, that the Richmond ore-body, if followed far enough, would be found to touch the quartzite. And its continuation is observable in the winze below the Richmond 6th level and in the drift driven northeasterly from beneath the ore-body at the northeasterly end of the Eureka ninth level. It appears, too, at this point only slightly, for the reason that it is not opened sufficiently far and because the general tendency of the ore-shoot is toward the northeast. All the indications point to its continuing much farther. Its depth at a greater distance will bring it to the quartzite. I made this prophecy in the past. It is partially fulfilled in the present. I look for it to be entirely fulfilled in the future.

In addition, the Richmond Mining Company have recently found what promise to be large and valuable ore deposits west of their shaft at the 5th level. They ran 3 levels, one above and one below the 5th level, in order doubtless to see if this body of ore
226 extends above or down any considerable distance. It appears here, and it appears there [showing], for some considerable distance. This ore-body seems to be totally separate and distinct from any ore-body they have heretofore had. It is not in connection with the ore-shoot, which they have heretofore worked, nor has it any present connection with any portion of the underlying quartzite, but that it will ultimately prove to be in the line of direction of a series of ore-bodies extending to the quartzite, I have no doubt. I think I have described all the prominent ore-bodies that are found in this zone. In addition, there are at various places, as for example in the Lizette tunnel, at the point L A and L B. little excavations showing isolated lodes of ore which seem to have no visible physical connection with any other body of ore; in other words, tending to prove that the zone is more or less mineralized from one side to the other. And it will readily be observed then,

from the statement of facts as I have made them, namely, an underlying quartzite, a zone of mineralized limestone, metamorphosed, changed, and altered from stratified limestone, with but a single exception, where it has the appearance of stratification, ore-bearing mineral on the contact of the two formations, the quartzite and limestone extending to the surface and branching out up towards the overhanging shale, as described by Professor Cotta, finding bodies of ore in the zones having no visible physical connection, finding main strata and veins of ore on the point of contact with the limestone,—what I called before I shall in future call the vein limestone,—lying beneath for many feet, having shoots of ore with a certain direction, following the law of all the wavings of the quartzite in most instances, sometimes, however, running
227 across it, generally, however, following the wavings. I think, in view of all these facts, I am justified in denominating this zone of rock a contact vein, having its limit of mineralization bounded by the overhanging shale. And I maintain that, according to the customs of miners, the usages of miners in the country, according to good mining policy, and according to common sense, the *whole* of that space should be considered and accepted as a lead, lode, or ledge of metal-bearing earth or rock in place. The fissure proper is found only at the point of contact. This is the deepest underlying point from whence the ore might have come up. This state of facts would bring it, in accordance with the description of other authorities, to a contact vein. In addition to that we find the isolated bodies enumerated in regard to whose ownership there may be an economic question. As a matter of theory it is our belief, and doubtless a fact, that these ore-bodies were derived from the same source as the ore-bodies found at the contact. The fact that the limestone has been so easily soluble in water, impregnated with carbonic acid, enables us easily to understood how the crevices through which they were filled could have been refilled or obliterated. As a matter, however, of economic mining geology, I maintain that for all practical purposes of law, custom, and common sense, that this zone should be considered a lead, lode, or ledge of metal-bearing rock in place, distinguishing the contact as such from the zone of mineralized material.

Q. Now, Mr. Keyes, have you found any ore in the quartzite south, or in the limestone north, of that zone of limestone?

A. I never have found any pay-ore myself nor do I know
228 of pay-ore having been found nearer than some of the mines of the Adams' Hill Co., to the north.

Q. How far off; what mine?

A. I take it that those mines must be not less than half a mile, probably, to the north.

Q. What mine would you name?

A. Those of the Adams' Hill Mining Co.

Q. At what distance?

A. Not less than half a mile, I think.

Q. Upon that belt of quartzite, between the Jackson and the Champion, are there workings of any mine—any hoisting works, shaft, or mining work prosecuted in the quartzite?

A. None whatever.

Q. In the quartzite between the Jackson and Richmond, opposite these two claims, throughout the whole length, is any mine worked?

A. No, sir; I know of none being worked or having been worked.

Q. How is it in regard to the lowest contact in the limestone between the Adams' Hill mine and the first shale, or hanging wall as you call it—is there any mine worked in that locality?

A. None that I know of. There is a new shaft started by the Richmond Co., but that I presume has not been concluded. I know of no other. There were some prospect holes, which have some stains of ore in them; it might have been low-grade ore, but none that went to any depth.

Q. Where is that new Richmond shaft started?

A. Immediately to the north, judging by the eye, sighted by the division line; it is very close to the continuation of the division line between the two companies. I judge it must be a quarter of a mile from the summit of the hill, probably more.

229 Q. Judging by the eye you say it is just a little to the west side of that line extended?

A. Yes, sir.

Q. And what is your idea about what that shaft is intended to cut, and what distance will it have to go before it can cut it?

Mr. Wren.—We object, what his idea is. It is not evidence.

A. The shafts are sunk for the same purposes.

Mr. Thornton.—Q. To what distance would that shaft have to go down from the surface before it would strike the lode dipping under it?

A. The average dip of the underlying quartzite is very near 45 degs. Being 45 degs., the two sides of the triangle are of an equal length. The one side would therefore represent the line from the surface running out on the horizon, and the other the perpendicular. They would be equal to one another. If you will state what you want to find out, I can tell the exact depth. From the summit of the hill it would be about 1,800 or 2,000 feet, I should judge.

Q. Well, can you estimate, roughly guess, how deep that shaft will have to extend before it cuts that lode?

A. O, the lode itself?

Q. Yes, the lode; it strikes through the shale, the hanging-wall shale, into the vein or lode.

A. If the hanging-wall shale has the direction that we see it now, and the dip that it has, it never will strike it. I don't see that it can.

agreement of the 26th. I have also the answer to that bill in equity on the other side and the cross-bill; and the replication, and our answer to the cross-bill. And I submit these to the court as pleadings in the case.

Direct examination of W. S. KEYES—Continued.

Mr. Thornton.—Q. At what time in any of the underground workings of these mines was the shale or shale hanging wall discovered?

A. It was during my superintendence of the K. K. mine; according to my recollection it was about four years ago. On arriving at the 3d level from the shaft, the drift was run to the north, which struck a thin seam of shale. The main drift easterly was driven in a northeasterly direction, and also struck the continuation of this thin shale at the point "3 R" on the K. K. map. It was traced along in that direction for a distance of 160 feet. Ore was found at the northerly extreme of the first left-hand northerly cross-cut. No ore was found between the points "3 R" in the direction of "3 D." For that reason the drift on the shale was discontinued, and run diagonally to the southeast for a considerable
234 distance in the direction of the point "3 D," and from thence on in a right angle with the main course of the thin shale, and continued, it would strike across the foot-wall. The last drift from "3 D" to "3 F" is in low-grade ore, and it has ore stains and ore the entire distance. It reaches within a very few feet of both quartzite and shale.

Q. Have you seen the shale in the workings of the Jackson?

A. I have.

Q. The first shale north of the quartzite?

A. Yes, sir.

Q. Have you seen that shale in certain workings of the Eureka Consolidated Co.?

A. Yes, sir.

Q. In the workings of the Richmond?

A. Yes, sir.

Q. Can you state whether or not it is the same line or body of shale?

A. In my opinion it is the same shale.

Q. What do you mean by the same shale?

A. I mean that it is sufficiently similar in appearance; sufficiently near in its direction, having in view such croppings as might be likely to result from the wavings of the underlying quartzite; that induces me to believe that it is the same shale.

Q. Do you or not think it is continuous from those points?

A. To the best of my observation it is continuous.

Q. It is your belief from your observation?

A. My belief from observation is that it continues for a considerable distance.

Q. You spoke about two bodies of shale. What do you mean by that? And what two bodies of shale do you refer to?

235 A. The larger body of shale is found in the railroad cut to the north of Ruby Hill; and southerly from what we have denominated the stratified limestone, which is visible on the surface.

Q. But where does that appear on the map?

A. In the representation as the upper end of the map. Following around through the gulch it is visible in the railroad cut; and it is visible again where the railroad turn-table or switch is, leading to the K. K. and Eureka dumps, and at several points beyond.

Q. Is that shale discovered in the underground works of the Jackson?

A. The broad shale is. This is the broad shale that I have been describing. Inside of that shale, and, in my judgment, running in and connecting with it at the Richmond, visibly, and presumably at the K. K., is this thin seam of clay, calcareous and resting upon a smooth slab or break in the limestone.

Q. You say you think the slab and this broad body of shale come together and unite?

A. I think so.

Q. Now tell us where.

A. In the Richmond, the thin shale running along the 7th and 8th levels from the point 7 H to 7 G, and on the 8th level from 8 D to 8 C, united, in my judgment, with the main shale somewhere under the point 7 F in the Richmond.

Q. Now, do they separate again, going east?

A. It is impossible to say whether they do or not, until we come to the K. K. At the K. K. we found a very similar-looking thin seam, and I judge that from analogy will connect with the course of the shale.

Q. Will connect where?

A. naturally it must take a different course to connect.

236 Continued in the same course it now has, it never will meet. It probably will take a curve; because we observe a little further to the west the grand promontory of the quartzite underneath, and at the Eureka ninth level, between the points 9 S and 9 T. This bulge or promontory of the foot wall is likely to exhibit or cause a corresponding bulge in the shale. It may be to the north of it. Anticipating such a curvature, the thin seam of shale found in the K. K., third level, would take a turn to the northwest; a direction which would bring it, if continued far enough, in connection with the broad shale on the north.

Q. Will you from the diagram represent those two lines, and point out on the map where you think they ran, and where they connect and separate?

A. The broad shale runs at the top of the map, curving from the northwest in a direction southeast. This calcareous shale passes into the shale limestone and stratified limestone; and then the seam in the Richmond unites, as shown on the map. The broad shale is

to the north of the point marked on this map between 7 F and 7 J, marked "hanging wall." The probabilities are that a large portion between this dotted line showing the probable course is calcareous shale and stratified shale. I know that from the point 7 F to 7 J the drift runs entirely through heavily stratified shale; and the little thin seam at the point 7 F disappears.

Q. Describe where they run, without giving their component parts.

A. They run from the northwest southerly, and the thinner shale would run at a more acute angle, so as to reach it.

237 Q. I want you to commence at the west end and draw a line along the map with the end of your stick, showing the course of each of these lines of shale, where they come together and where they get out.

A. I can only assume where they come together in the K. K., for I know nothing about their coming together.

Q. Give your idea of it.

A. My idea of it is that they come together. I know that they come together at the Richmond.

Q. Show how.

A. The body of shale running past and in front of and to the north of the Richmond works, which shale is cut by the shaft at the 200-foot level from the surface. It is the broad shale running past the shaft and towards the gulch. I have misstated the general direction of the main shale. It is northeast. Easterly to the northeast, passing through the cut in the railroad gulch and then, in all probability, turning beneath the bluff, which is about 1,000 or 1,200 feet distant and a little east of north of the railroad switch. This shale passes then, in my judgment, through to the east of the Jackson mine. A portion of the same broad shale is visible underground in the Richmond workings. That shale ought to be at or about the points 7 L or 8 E, I think. The thinner shale, as I have stated, runs in the direction of 7 H and 7 F, uniting with the broad shale at or about the point 7 F. The breadth of this shale it is impossible to determine. I don't know its exact width, but it takes a generally eastern direction from the front of and to the north of the Richmond shaft, through the gulch, until it turns in front of the switch to the K. K. and Eureka. The same shale, or what I believe to be the same shale, at the position of the K. K., is a very considerable distance north of here.

238 Q. To the north of what?

A. To the north and east of north of the K. K. shaft. This shale, in order to reach the continuation of that shale, would necessitate a bellying inward of the large shale. Whether that takes place or not I don't know. But it is very likely to have been thrown considerably forward, for the same reason that I have noted here the probability of the turn of the K. K. shale, namely, this promontory. And that would throw it far forward. It is observed here that in

order to make this connect with this shale, it would have to take a turn almost at right angles, to get out. This is entirely speculative. I don't know how it can turn there. It is underneath the ground, and no one can see it. The only place where it can be seen is at the Richmond, and whether the same phenomenon occurs or not at the K. K., I don't know.

Q. I don't understand your explanation. You have seen shale along there on the drift of the seventh level of the Richmond, from "7 H" to "7 G," a line of shale?

A. Yes, sir.

Q. You have seen shale from "7 F" to "7 J," along the seventh level of the Richmond?

A. Yes, sir.

Q. You have seen shale at "10 C" on the 10th level of the Eureka Consolidated?

A. Yes, sir.

Q. And for some distance exposed along the drift running to the west, to the point "10 E?"

A. Yes, sir.

Q. You have seen shale near the mouth of the Bell shaft tunnel?

A. Yes, sir.

239 Q. Shale at the point "8½ A," at the northern end of the 8½ level drift?

A. Yes, sir.

Q. You have seen the shale on the third level of the K. K. at the point "39 B," and from "3 R" to near the point "3 D?"

A. Yes, sir.

Q. Is it or not your opinion that there is a continuous line of shale, of which these different places are parts, from that point "3 D" to the point "7 H," or not?

A. I have no doubt it is the same.

Q. Now, do you say that this is one line and body of shale?

A. In my opinion it is.

Q. Do you say that there is another body of shale with which it connects at or near the point "7 F?"

A. Yes, sir.

Q. Which body of shale is broader in extent?

A. Yes, sir.

Q. And which body of shale curves around and runs along in nearly the same course, but much further to the north?

A. Yes, sir.

Q. Do you say that that thinner or first shale from the quartzite and this heavier shale come together in the third level of the K. K?

A. No, sir; they don't come together there.

Q. Do you say that, being protracted to the east, they came together at or in the workings of the Jackson?

A. According to my belief they do come together.

Q. Why do you think so?

A. For the reason that I see no other boundary line be-
240 tween the two at the Jackson mine. The shale has curved around at that point, and running more or less north and south, and between the shale and underlying quartzite I find nothing but what I call vein limestone.

Q. But have you anywhere found that enormous body of shale coming down and joining the shale—that is, the hanging wall?

A. I have seen but one, and, consequently, if they do continue that far, they certainly join. They are united in the same way as they are united here [showing].

Q. Do you see the point of union underground?

A. No, sir.

Q. Have you seen any point of union on the surface?

A. No, sir.

Q. Why do you think they come together?

A. Because they totally disappear. I can see them no further.

Q. You don't know whether they come together or not?

A. No, sir.

Q. Is it your opinion that that shale in the workings of the Jackson, in the drift from the bottom of the Jackson tunnel running south, is the same line of shale, and could be traced and followed by workings all of the way along in front of the Phœnix, the K. K., Eureka Consolidated, and Richmond?

A. It is my belief and opinion that it could.

Q. Your idea, in stating about this northern body of shale, is to show its connection at that point with the thinner body of shale, was it?

A. That was all, sir.

Q. What was the thickness of this body of shale exposed in the 3d level of the K. K?

241 A. It varies from half an inch up to about 18 or 20 inches.

Q. What is the thickness of it as found at 8½ A?

A. I should judge it was of a similar thickness.

Q. What is the thickness as found at 10 C?

A. At 10 C it looks very similar. It has been cut into but a very small depth. It has been cut in but 2 or 3 feet, I think.

Q. What is the thickness near the mouth of the Bell shaft tunnel?

A. From 8 to 14 inches, I should think. Perhaps a foot and a half.

Q. What is its thickness as exposed in the workings of the 17th level of the Richmond at 7 F?

A. That is where it joins the main shale, but I can tell nothing about the thickness of it. The main shale is very thick there.

Q. After it joins the main shale it becomes a part of it?

A. Yes, sir.

Q. And runs with it to that point and there it separates?

A. Yes, sir; and there it separates and becomes thin shale.

Q. But still continues in a normal course?

A. Yes, sir.

Q. In speaking of a formation there, what lies north of the first shale that you reach in going from the quartzite?

A. In passing the first shale going north and easterly, at such points where the two are not, in my mind, co-incident, we find limestone in almost every instance stratified, and the stratification is, more or less, running south, and at a right angle with the general course of the shale.

242 Q. What is the distance on the surface between the shale at the mouth of the Bell shaft tunnel across the limestone to the shale on the surface?

A. I should judge at the surface it was 600 or 800 feet; 600 probably.

Q. After these two shales have come together as you have described in the Richmond workings, what is the formation of rock found north or in the locality north of the point of junction?

A. Limestone. After the calcareous shale is ended we find limestone again.

Q. After this body of shale is passed, which you have described as running to the north and uniting with the other shale at that point, what lies still farther to the northeast? What do you find?

A. Limestone with intercalated strata of a soft disintegrated mass, apparently marl.

Q. Do you find any further lines of shale there, or bodies of shale, for half or three-quarters of a mile?

A. Not until as we advance further northeast, where we find the shale which bounds the series of mines lying about at this point, which is three-quarters of a mile from this shale.

Q. Have you ever found any quartzite northeast of that shale?

A. None but the quartzite hill in the direction of the town.

Q. About where is it on the map?

A. It is probably beyond the upper right-hand corner on the map, a half a mile distant.

Q. In your opinion, from the developments and workings which you have examined underground, in the Richmond and Eureka, does or does not the body of ore found at the Potts chamber at the west end of the 9th level, and at the west end of the 5th level,

243 connect with any of the croppings, either in the Champion or Richmond locations or patented surface ground?

A. As for visible connection, it has not yet been developed.

Q. I ask you your opinion.

A. In my opinion the surface bodies and those down yonder come from the same source, and are really part and parcel of the same deposit.

Q. From your experience in working the ground, do you think that they can be actually traced together or not?

A. My impression and belief is that they could.

Judge Sawyer.—Q. Are there any ore-bodies between those two strata of shale?

A. I am unaware of any pay-bodies having been found there. There have been some iron stains found there, and some very low-grade ore. I am not aware of any pay-ore having been taken out between them at any place.

Q. Does the grade of limestone between those two strata correspond more closely with that south of the southerly strata than that north of the northerly strata? Or how does it compare?

A. At the K. K., 2d level, as we go to the northeast, no penetration to any depth has been yet made; 25 feet is the extreme limit, and in that the limestone is unstratified. To the northwest, at the ground of the Richmond, after passing through this thin shale, we come to plainly stratified limestone, which comes in another direction; the strata running towards this unstratified body of limestone, which I have called plain limestone.

Mr. Thornton.—Q. Have you in your possession specimens
244 that you can present to the court, of the ore found within these mines, and of the quartzite, and of the limestone, and of the shale found there?

A. I have a very complete collection of both the quartzite and the shale of all three of the mines, and various characteristic specimens of the vein, limestone, etc., and of the various ores of the various mines. If the court would like to see any or all of them I will show them.

The Court.—Let the counsel select those which he wishes shown.

[Mr. Thornton selects several of the specimens, which the witness describes to the court.]

Mr. Thornton.—Q. Did you take any specimens for assays from the 5th level ore-chamber, from the 5th level Eureka Consolidated, and down to the 9th level ore-body, and through to the Potts chamber?

A. I took samples every few feet for the whole distance.

Q. Can you now give to the reporter a description of the places from which you took these assays, or the samples for assay?

A. I can, as I wrote them down at the time of taking.

Q. Who was with you at the time you took those samples?

A. Mr. Foreman, superintendent of the Overman and Caledonia mines; Mr. Smith, from the Belcher; Mr. Donnelly, superintendent of the Eureka, and Mr. James, a surveyor from Virginia, and myself.

Q. Now state the points from which you took the samples for assay.

A. I took 57 samples.

Q. Give us the samples that were to be assayed.

A. They are all to be assayed.

Q. Take from the 5th level down to the 9th level, and across to the Potts chamber.

245 A. Sample No. 5 is black carbonate found on the contact. By contact, in this connection, I always mean the quartzite until we get down to the Potts chamber, "15 feet down the winze, near the end of the stopes, at the end of the 5th level;" sample No. 6, at end of first ladder in roof on contact; No. 7, sample in horizontal connection, 28 feet from first ladder on contact; No. 8, sample from top of second ladder on contact.

Q. We simply want you to give the description to the reporter, so that in future we can refer to them. Describe the exact locality of each sample.

A. The second is No. 6, and is at foot of the first ladder in the roof on the contact. The winze starts down with the ladder and follows it straight down to the foot of the ladder.

Q. Didn't you measure the distance between these places with a tape-line?

A. Not always.

Q. State about how far apart they are.

A. My recollection would make it 15 or 18 feet further down.

Q. Say, then, 18 feet further down?

A. Yes, sir; more or less. No. 7 is sample in horizontal connection, 28 feet from first ladder, on the contact. A little horizontal connection. Where it is marked in light on the map the connection is horizontal. Where it is shaded, it goes down.

Q. I would suggest that you take a pencil and mark each location on the map. Commence with No. 5, and put the figure 5 there where number 5 was taken from.

[The witness makes figure 5 upon the map.]

Q. What is the next number?

246 A. No. 6, at the foot of the ladder, at figure 6 on this map. Sample No. 7, in horizontal connections 28 feet from first ladder, and on the contact, at point marked 7 on the map. No. 8, top of second ladder on contact, at figure 8 on the map. No. 9, top of stope on foot wall, 16 feet down second ladder, at figure 9 on the map. No. 10, top of winze, down the 7th level, at the point marked 10 on the map. No. 11, 18 feet down on wall below top of winze to 7, at figure 11 on the map. No. 12, 34 feet further down, at the foot of the ladder, at about point marked 12 on the map. No. 13, top of ladder, at point marked 13 on map. No. 14, at top of straight ladder, about 18 feet down, and 2 feet from the contact, at about the point marked 14 on the map. No. 15, at foot of straight ladder, at the 7th ladder, galena at the contact, at or about figure 15 on the map. No. 16, at the end of 7th level, at the top of the winze, at or about figure 16 on the map; at or about the point 7 N, where it is marked "winze down." No. 17, 48 feet down winze below 7 N, black and yellow carbonate ore to the depth of 48 feet, at or about the point marked 17 on the map. No. 18, at a point on foot wall in new foot wall drift toward cave winze, 17 feet east, at or about point marked 18 on the map. No. 19, at head of winze to

8th leading to cave, sample taken on contact, at about the point marked 19 on map. No. 20, at point on contact 15 feet west from cave winze, at or about figure 20 on the map. No. 21, 17 feet down winze to A, and about two feet from the contact, at or about figure 21. No. 22, at a point 22 feet further down, on contact, on or about point marked 22. No. 23, at a point 17 feet further down, on contact, on or about figure 23. No. 24, at a point 26 feet further
247 down, on contact, at perpendicular part of winze, at or about figure 24. No. 25, at bottom of winze of eighth level, at or about figure 25. No. 26, at point 27 feet westerly from the bottom of winze, on foot wall, on or about figure 26. No. 27, top of new winze leading to the cave in the 8th level, at or about figure 27. No. 28, at end of 8th level, at foot of upraise, at or about figure 28. No. 29, at foot of winze in drift under cave, at or about figure 29. No. 30, in cavern, 35 feet in the course of the drift from the foot of ladder, at or about point marked 30. No. 31, bottom of winze, under cave, on the 9th level, beneath the cavern, at or about figure 31. No. 32, at point 45 feet west from Burleigh cross-drift, at "9 T," and at corner of south drift, to winze leading to Potts chamber, at or about figure 32. No. 33, on foot wall at the south end and in connection running from the Potts chamber, 17 feet on, at or about figure 33. No 34, at head of perpendicular winze, west from No. 33, at connection to Potts chamber, at or about figure 34. No. 35, at bottom of perpendicular winze, near contact, 30 or 40 feet below the point marked 34, at or about figure 35. No. 36, about 10 feet from bottom of winze going west along contact, at or about figure 36. No. 37, 25 feet from number 36 westerly, on contact, at or about figure 37. No. 38, about 20 feet from number 37, along contact, at or about figure 38. No. 39, about 20 feet further along contact, at or about figure 39. No. 40, about 20 feet further along the contact, on or about figure 40. No. 41, about 20 feet further, and along contact, at or about figure 41. No. 42, about 20 feet further and near to the stope ground, at or about figure 42. No. 43, about 10 feet further, and in the stope ground, what we call Potts chamber, at or about figure 43.

Q. Did you take any other samples for assays?

248 A. Yes, sir; a number of samples on the surface and some samples in the ninth level of the Eureka.

Q. Did you deliver them to the assayer?

A. I did, and they will be finished to-morrow.

Q. Give their numbers and places.

A. Sample No. 1 was taken at the so-called Iron shaft on the ground of the Richmond Co., at or about point marked on map "A" on the Richmond. No. 2 is at a point about 100 feet southwesterly from the Iron shaft.

Q. Is the Iron shaft at the point marked "A?"

A. Somewhere thereabouts; I don't know where it is. It looks to me to be wrongly put on the map. But the sample was taken at the

Iron shaft. No. 2, 100 feet southwesterly from the Iron shaft, at or about figure 2 on the map. No. 3, at a point on the road southeasterly from the Richmond and Tip-Top inclines, in the direction of the Champion about 200 feet, at or about a point marked III. No. 4, on the road about 40 feet southeast from that point and at the mouth of the shale. A drift runs in there somewhere at or about point marked IV. The road not being on the map, nor the Iron shaft correctly designated, I have put them on there as near as I could fix them. No 44, at extreme west end of Eureka 3d; number 45, at the point of contact of vein limestone and the underlying quartzite on the Eureka Consolidated ninth level, at the point marked "9 A" on the map. Number 46, 30 feet from Engine stope at ninth level of the Eureka, at or about figure 46. Number 47, 65 feet on ninth level, east of drift leading to cavern on said level, at or about figure 47. Number 48 is 31 feet farther easterly, at or about figure 48. Number 48 was a cavern. Number
249 49, 12 feet further, likewise cavern, at or about figure 49. Number 50, 28 feet further east in the same drift, at or about figure 50. Number 51, 81 feet further, at or about figure 51. Number 52, 12 feet further, and opposite to cross-cut to upraise to the 8th level, at or about figure 52. Number 53, 20 feet in cross-cut to the south leading to the upraise to the 8th level, at or about figure 53. Number 54, 30 feet in same cross-cut farther in, at or about figure 54. Number 55, on 9th level of Eureka, at top of what is called 80-foot winze, at or about figure 55. Number 56, the northwest corner of north cross-cut, leading to the 10th level, at or about figure 56. Number 57, at contact on Skylight drift, near to the point marked "9 G," at or about figure 57.

Q. How did you take those samples?

A. With two exceptions, I took them all with my own hand. The only one—the only ones that I remember taking other than by my own hand, were by Mr. Smith, one at the foot of the winze at the 7th level, and one at the Iron shaft.

Q. What do you use to take them with?

A. I use a small steel pick. I took them out of the ground with that pick, and put them in a bag. All persons present noted the number and position; and I wrapped the bag up, and we carried the bags, as the samples accumulated, amongst us. Nobody else touched them. Every witness noted in a book at the time of taking them, and described the place in their own words, and they will correspond very nearly with the exact words I have given. Each one noted in his own book the place and position where these assays were taken. I put them in bags and tied them up securely, and they were never out of my sight, or that of some person's sight engaged in taking them, except where they were under seal.

250 Q. Did you put any memorandum in writing in the different bags, or attach them to the different bags?

A. In each one of the bags I placed a paper containing its num-

ber; and with a pencil put its number on the outside of each bag. The bags were made of heavy white canvas.

Q. This party brought the bags up to the surface, did they?

A. We brought the bags together amongst us. We then put them in a box, and sealed the box with sealing-wax; and Mr. Foreman sealed it, I believe, with a peculiar key that he had.

Q. How did you put the sealing-wax on the boxes?

A. The first samples that we collected were tied together, as many as we had collected, and sealing-wax was placed upon the knot, and was then stamped with the key; and these were taken by us down to the office of the Eureka Consolidated. Subsequently we collected a still further lot, and put them into this box, which box was sealed, and never was opened except in presence of all of us. We opened it at one time to compare the numbers, and took out a small portion to have some assays made on them, and they were replaced with a tin tag upon each one of them, and tied and sealed; and after all had been collected a seal was placed on the box, and it was screwed down, and the screws were counter-sunk, and molten sealing-wax was poured on top of the screws, and the box was bound with iron so that it could not possibly be opened without its having been apparent, no matter how skillfully it might have been closed again. The seal was placed upon the screws,
251 which were driven into the counter-sunk holes and sealed with a peculiar seal which I carry on my watch-guard here, and left by Mr. Donnelly in the office of Wells, Fargo & Co., in Eureka, and by them shipped to my address here; they taking it with the seal unbroken, and delivering it to the state assayers, likewise with the seal unbroken. I have never seen the samples myself from the time they were closed up in Eureka. They were delivered with the seal unbroken.

Q. You saw the box with the seal on it when you delivered it to the state assayer?

A. Yes, sir.

Q. Was that an uncommon seal?

A. Exceedingly uncommon. It is a fossil seal which I carry on my watch chain. The same seal was upon it when I left Eureka last and when I saw it again in this city, when I delivered it to the state assayer.

Q. Was it, or not, possible for those samples to have been changed from the time you took them from the rock, in the mines, until you delivered them to the assayer?

A. I don't think it could have possibly been changed by anybody. The only persons who could possibly have touched them were the parties mentioned. We were all together in handling them.

Q. What was the tag finally put in each bag?

A. A tin tag, stamped with the number of each one; and the state assayer does not know one from the other, except by the tag.

Q. Along the course by which you took those samples, can you describe briefly the appearance of the works that have the ore, and the kind of ore, commencing at the beginning?

A. In the connection from the northwesterly end of the Eureka fifth level ore-body, there was pay-ore on the contact, or
252 near the contact, for the entire distance, down to the 9th level of the ore-body. At some of the places the ore was not so good as at others. I can state them specifically, if necessary. But there was an ore connection in the whole distance, mainly in first-class ore; and assays will show exactly what kind of ore it was, without my stating it; I mean the value.

Cross-examination of W. S. Keyes:

Mr. Wren.—Q. What is the foot wall of the ore-body in the Richmond?

A. Limestone.

Q. I mean the ore-body in the Richmond mine.

A. Limestone.

Q. What lies immediately on the limestone, between the limestone and the ore, at any point you have noticed in the mine; at the croppings, and for 30 or 40 or 50 feet down below the croppings?

A. Commencing at the Richmond cave we find oxide of iron ore, good ore, fair ore, and poor ore.

Q. Quartz ore?

A. No, sir. Ore of various kinds.

Q. Isn't there a body of quartz, 3 or 4 feet in thickness, containing gold, quite rich, lying on the foot wall?

A. No, sir; I have never seen anything of that kind.

Q. Did you ever see anything of that kind in any of the mines upon the hill?

A. Inside of the limestone?

Q. Yes, sir, or inside of what you call a vein.

A. I have never seen quartz inside of a vein, except in one position, and that is at the third level of the K. K. mine.

Q. And that is an irregular body of quartz?

A. That is an irreguler body of quartz, and quite phenomenal.

253 Q. And that is the only place you have seen gold-bearing quartz in any of these veins on Ruby Hill?

A. Pure quartz? Yes, sir. I have seen silicate of iron, which contained some gold and some silver, at various places.

Q. But its occurrence is exceptional?

A. As making a foot wall, I think it is entirely exceptional. And as to the point you speak of, at the surface, underneath the cave at the Richmond, I don't think that that body found there is quartz.

Q. How many strata of ore are there, commencing at the foot wall and extending upward, toward the top of the ore-beds or hang-

ing walls, in the Richmond mine? Is there any appearance of stratification at all in the ore-beds?

A. I cannot say. I don't think there is.

Q. You never saw any appearance of the different strata of ore in the Richmond?

A. If you call branches strata, I think there are.

Q. No, sir. You know what strata are?

A. Yes, sir.

Q. You never have seen anything of the kind?

A. I have seen the appearance of stratification of ore when the ore is in chambers, when the ore has filled caves. I am not aware of other stratification than that.

Q. You have never noticed any number of strata or different kinds of ore occuring in the Richmond body, or any of those others, have you?

A. I have in places noticed a peculiar appearance of streaks of one kind of ore at one place, and another kind of ore at another place. We have streaks of yellow ore, and streaks of red ore, and streaks of black carbonate. I don't know that you would
254 call them strata, although they may have been put in in such a manner, one on top of another, which would constitute stratification.

Q. What is the greatest thickness you have ever noticed of the Richmond ore-body, until you get to the Lookout mine, from the surface down?

A. I can only answer from memory.

Q. I mean from the hanging wall to the foot of the ore-body.

A. I should think it must have been 60 or 70 feet in places.

Q. You never noticed any greater depth than that that you recollect of?

A. It might have been greater. I have been in there a number of times, but never measured.

Q. Your best impression is that it is about 60 feet?

A. It may have been larger. These bodies enlarge in places to a very considerable size.

Q. Do you know when the quartzite was first exposed anywhere on the Richmond mine?

A. I do not, sir.

Q. You made a report on the Richmond mine to the English company that bought it, didn't you?

A. I believe I did, sir.

Q. See whether you can recollect the following language, which occurs in your report to that company, or not: "Office of the 'Eureka Consolidated Company, Eureka, Nevada, June 21st, 1871. 'To the Richmond Mining Company: Herewith please find results 'of my examination of the properties of the Richmond Co.; also 'some incidental remarks on the geology and lithology of Ruby Hill. 'Sincerely, your obedient servant, W. S. Keyes, M. E., graduate of

'School of Mines, Saxony; Deputy of the U. S. Minn. Land
255 'Commission, and Superintendent of the Eureka Consoli-
'dated Mining Company. The Richmond Mining Co., an
'incorporation under the laws of the State of Nevada, is the owner
'of three mines, as follows: First, the Virginia, 1,400 feet in length;
'second, the Richmond, 700 feet in length; and third, the Colorado,
'1,400 feet in length. All are situated in the northerly end of Ruby
'Hill, District of Eureka, State of Nevada, and are immediately ad-
'joining the well-known mines of the Eureka Con. Mining Co.
'They have been located parallel with one another, at a distance of
'200 feet, so that it is impossible for any possessory claimants to
'find room to make any new locations between them. The forma-
'tion is very simple, viz., a quartzite foot wall with a clean clay
'selvage from two to four feet thick. Then the vein matter and
'gangue (extending from the quartzite, broken only by occasional
'intercalations from the 'cap' or hanging wall), a distance of 250
'or 300 feet, quite to the surface of the ridge."

Q. Do you recollect saying that in your report of the Richmond Company?

A. I do—something similar to that; and I can give the reason for every term in it.

Q. What is a bedded vein?

A. A bedded vein, according to the authorities, as I understand it, is ore to be found between a strata of stratified rocks following the lines of stratification.

Q. How is a bed-vein formed? Or, in other words, in what ore is the foot wall of the bed-vein, or bedded vein, or the vein itself, and hanging wall deposited?

A. That is a matter of opinion and theory.

Q. I want the accepted theory in regard to it.

A. The fact of finding the ore between the strata makes
256 it a bedded vein without any question, whether that ore came into its position intermediate between the deposit of the various strata, or whether it came in by lateral secretion, are matters about which opinions differ, but do not change the name of that form of deposit. The name as given is simply to distinguish them; and various authors and authorities have different explanations to account for the ore coming so. I don't think that it is necessary, for the word "bedded vein" carries its meaning with it, without reference to the opinion of the person using it, as to how the ore came in there. It merely relates to its position.

Q. You find no branches in a bedded vein extending into either wall, do you?

A. If the bedded vein is pure and simple, naturally you will not find it. But no veins are found pure and simple, I believe; or a perfect type of its class. They are generally combined.

Q. What has been your theory in regard to the relative time of

deposit of the foot wall of a bedded vein; of the vein itself, and of the hanging wall or cap-rock?

A. I must confess that I have not given the subject sufficient study; in fact, I do not consider that it is a matter of any importance.

Q. Have you ever had any opinion in regard to it?

A. I may have had, and have expressed opinions, but I never have investigated the subject so thoroughly as to say that I am entirely satisfied at present.

Q. Did you use this language in your report that I have already read from?—"This class of ore deposit has been by the Germans 'properly designated as 'lager gangue,' or bed-vein. And their 'permanence is to be judged by the character of the foot wall or 'rock on which they rest; *not* from that of the subsequently de-'posited cap or shale."

257 A. Precisely.

Q. What do you mean by that; that the cap or shale was deposited subsequently to the deposition of the vein, or not?

A. From the reading of that, it would probably be so. I know that in the early times, when that was written, it was a matter of entire uncertainty. There was no positive proof as to the real formation on Ruby Hill; and it took time and close observation to have arrived at a satisfactory conclusion.

Q. Did you use this language in your report?—"I speak with 'greater confidence of the formation of Ruby Hill since nearly six 'months of vigorous development under my own direction has 'sufficed to establish with almost mathematical accuracy the follow-'ing points, viz: A—The regular quartzite foot wall, with clean 'clay selvage. B—The 250 to 300 feet of vein matter; a large 'portion naturally unfit to be worked at present rates of labor and 'material. C—The different ore-bearing strata."

A. Precisely. I have a very distinct recollection of that.

Q. "Each differing in its physical qualities as well as in its assay 'value in gold, silver, and lead. These strata vary in thickness 'from a span up to 30 or 40 feet. In general terms the ore strata 'near the quartzite are highly silicious, carrying but little lead or 'gold and siver. The intermediate strata are highly ferruginous, 'and rich in gold and silver, with a sufficiency of lead for working 'purposes; while the upper strata near to the lime cap are very 'rich in lead, moderately valuable in silver, and comparatively poor 'in gold."

258 A. Each fact as stated there was observable very plainly in the old surface bodies of the Buckeye. The surveys drawn from facts, as then shown, were perfectly correct as to those conclusions. The surface of the Buckeye was the only place where any considerable work had been done. After six months' excavation, or a little more or less, the quartzite was for the first time discovered in the workings. It was visible on the surface, and all

of those apparent strips or strata were visible at that time; and the conclusions derived from the state of facts, as then known, were legitimate, proper, and just.

Q. You made the report on the Richmond mine, and not on the Buckeye?

A. Yes, sir; but I stated in that report, I am quite confident, that I observed these facts in view of the Buckeye. And even if it is not stated there, I drew my facts from the mine most open, namely, the Eureka Consolidated?

Mr. Thornton.—We stand by this report yet.

Mr. Wren.—Q. You told me that the bed-vein was a vein lying between different strata of rock?

A. Yes, sir.

Q. You reported to the Richmond Mining Company that that vein was a bed-vein?

A. I was mistaken in my designation.

Q. Can't you tell whether rock is stratified just as well by walking over it in a minute as by excavating in it for years?

A. The surface is apt to be entirely disintegrated and destroyed. It may be stratified below the surface and not on or near the surface. The fact of these bodies lying so flat induced me to conclude that they must have been bedded deposits. Deep developments have proven that they were simply a local peculiarity.

259 Q. Who employed you to make that report?

A. Mr. Doner and Mr. English, I believe.

Q. They were trying to sell that mine in the English market?

A. Yes, sir.

Q. You knew that fact?

A. Yes, sir.

Q. How much did they pay you for writing that report?

A. Two thousand dollars.

Q. Were you well acquainted with all of the facts at the time?

A. With all of the then obtainable facts.

Q. How long did it take you to write that report?

A. Not very long.

Q. Half an hour?

A. Perhaps an hour. I don't know. Not a very long time.

Q. You were already thoroughly acquainted with the ground, so no examination was necessary?

A. I was well acquainted with it at that time, as far as the developments showed.

Q. When you made that report, could you see stratified limestone on the hill where the mines cropped out, or not?

A. I doubt whether I could see the veritable stratified limestone. I could see what might induce one to think that there was stratified limestone further in. I don't think that I saw then or since a plain strata of stratified limestone.

Q. Where did you find your clay gouge three or four feet in thickness?

A. In the Eureka Consolidated Works.

Q. At what place in the Eureka Consolidated Works?

260 A. It must have been on the quartzite. I took for clay gouge probably the soft, deep-set quartzite, if there was any such. I do not remember myself. It was several years ago. That is the only place you are likely to find it.

Q. You cannot recollect, then, where you found any clay gouge three or four feet thick?

A. No, sir; I cannot.

Q. You did not find any such gouge in the Richmond, and none such has ever been found there?

A. I don't claim that there was such found in the Richmond.

Q. Did not you report in that regard that there was a clay gouge three or four feet thick in the Richmond?

A. I think not. I don't so understand it. The understanding was that it described the mines I knew best there. That is far below the present Richmond works—100 feet or so below.

Q. You were superintendent of the Eureka mine for several years?

A. Yes, sir.

Q. You went in charge about January of what year?

A. 1870.

Q. Did you make a report to that company the next spring or summer?

A. Yes, sir; at the annual meeting, whenever it was.

Q. Do you recollect this language was contained in your report or not?—"To a better understanding of the company's properties, a 'word or two in reference to the formation may not be out of place. 'Ruby Hill, whereon all of the claims are situated, is an isolated 'spur, and from the main range reaching down towards the 261 'valley. The underlay or under wall of the ledge is a hard 'quartzite. On this we find a second clay selvage of from 'two to four feet thickness. Immediately upon the clay is found a 'less quartzy stratum of ore rich in gold, moderate in silver, and 'almost barren of lead. Above this we find the true vein matter '300 to 350 feet in thickness, consisting of decomposed and com-'pact oxides of iron, in and through which occur the true ore-bear-'ing strata, varying in size from a few inches up to 35 and 40 feet. 'These, of which we have certainly eight, although frequently thin-'ning out, have never in a single instance disappeared; thus fur-'nishing the clue, to follow which may at any time open into a pay-'ing body. Superimposed upon the vein matter we find a capping 'of altered limestone thin on the southwest slope of the hill and quite 'thick on the opposite side; piercing the crust of all lime rock or 'irony vein matter has in every instance been reached, the Lookout 'shaft alone excepted, where the overlay seems to be exceptionally

'thick. The vein is of a character known as a 'bed-vein.' It may 'also be viewed as a regular contact vein, having a limestone hang-'ing wall and a quartzite foot. The underlay dips to the northeast 'at an angle of 38 to 40 degrees on the south end, and 80 degrees 'near the center of the hill." Did you use that language in your report?

A. Most certainly I did; and I am surprised at the accuracy of it to-day. It was a prediction, and it has proved almost entirely true.

Q. How long have you been of the opinion that there was a lode running through that hill?

A. From the time when, as superintendent of the K. K., I directed the prospectings to be carried only or principally upon
262 the quartzite foot here. My observations up to that time had induced me to consider that the foot wall, namely, the quartzite, was the guide to the ore; and since that time this process or method of prospecting has been continued in the K. K. mine, and from the time of M. Donnelly's superintendence, or perhaps before that, in the adjoining mines of the Eureka Consolidated.

Q. And it has never met with success in the Eureka mine in a single instance.

A. I don't know that it has failed.

Q. Tell me a single instance in which that system of prospecting has ever succeeded in the Eureka mine?

A. As a matter of fact, the second ore-body beneath the 9th level, connected to the 5th level, is all of the way on the contact.

Q. And that was found by running all of the way in limestone, wasn't it?

A. No, sir. It might just as well have run on the contact, but that would have been a longer course. Ore had already been discovered on the quartzite wall; but in order to get at a given point the quickest, a straight line was driven by a drift, and then they cut back to the foot wall.

Q. [Showing on the line.] Is this about a straight line?

A. There are two straight lines; one out from the shaft and thence parallel with the underlying foot wall.

Q. Wasn't this 5th level driven on the line of contact from 5 C to the Bell shaft, or to near the Bell shaft?

A. It was, sir.

Q. And they did not find a pound of ore there worth taking out?

A. No pay-ore.

263 Q. Then that level did not succeed?

A. No, sir.

Q. Was not the 7th level driven along the line of contact from 7 G to 7 L, most of the way?

A. From 7 G to 7 H it does not purport to be driven on the contact. From 7 H, on, it was driven on the contact.

Q. They did not find a pound of ore there where they took it out?

A. No workable ore.

Q. They did the same thing on the 8th level, didn't they?

A. They found no workable ore between 8 H and up towards or near to the point 8 J.

Q. Do you know for what purpose this level was driven there?

A. I do not, unless it was to prospect the ground.

Q. Do you know where the Skylark claim is situated?

A. Yes, sir.

Q. Did you commence work on the Skylark?

A. I did.

Q. As superintendent of the K. K?

A. Yes, sir.

Q. In what direction is the Skylark claim situated from the Eureka Consolidated Company's claims?

A. It is northerly or northeasterly, in front of them.

Q. It is northeasterly, isn't it?

A. Yes, sir.

Q. Did you purchase the Skylark; and, if so, how much did you give?

A. I purchased it, or had it purchased. I cannot remember the exact figure—for about $2,500. I think it was then patented.

264 Q. The Skylark lies immediately outside of your shale hanging wall, doesn't it?

A. I judge it does; yes, sir.

Q. And the shaft is sunk in the limestone lying immediately outside of you?

A. I judge it must be.

Q. Did you find any ore in the Skylark?

A. None that would pay. There were some little iron stairs of low-grade stuff found in the first level, and the drift ran off; but it was valueless.

Q. Then you do know of ore being found immediately to the northeast of the shale in the limestone; that, you say, is in vein limestone?

A. Yes, sir.

Q. Between what you call the first and second zones of shale?

A. Yes, sir.

Q. Where does the zone of shale or clay run, with reference to the Lawton shaft? In your opinion, that is found in the workings of the K. K? Where, in your judgment, will the shale found in the second level of the K. K. come to the surface with reference to the K. K. shaft?

A. At a point about 45 or 50 feet north of the northeast corner of the K. K. mine engine-room. Some years ago, when the shale was discovered at the second level, Mr. Reed projected it about to the surface and pointed out the place where it would be likely to

come up; and I went to that place and found a little decomposed seam corresponding on the surface at or about the place where its projection would bring it.

Q. Did not you buy the claim for the K. K., situated just to the northeast of the mine, where you say the shale would come to the surface, if continued up, only a year or two years ago?

265 A. Yes, sir.

Q. And you found iron croppings there?

A. Yes, sir.

Q. Then there is another claim, you know, lying immediately adjacent to this shale, and between the first and second belts of shale, in which ore was found?

A. I stated that there were such places in our examination-in-chief, and had particular reference to those two places.

Q. Who located the K. K?

A. Do you mean the K. K. proper? I myself and my foreman; there are 26 claims altogether in the K. K. locations or claims.

Q. In whose employ were you when you located that claim?

A. I think I was superintendent of the Eureka Consolidated claims.

Q. You located the K. K. right on the dip of the lode of your employers, didn't you?

A. No, sir.

Q. In what direction does this lode dip at this point [showing]?

A. This lode as a whole?

Q. Yes, sir.

A. It dips to the northeast.

Q. That takes in the K. K. shaft and quite a lot of the K. K. workings, don't it?

A. As these lines are drawn, it does.

Q. As I understood you, you said this was the dip [showing]?

A. It is the general dip.

Q. Then that includes the K. K. shaft and workings and quite a number of the underground workings of the K. K. mines?

266 A. Few or none of them.

Q. What is ore?

A. Ore, to speak generally, is some mineral substance which on metallurgical treatment will yield a valuable or useful metal.

Q. Is that a correct description or definition?

A. I think that ore is economically understood to be some mineral substance which, on working, after having been worked, will yield some useful or valuable metal. That is a commonly understood expression for ore, which I think is correct.

Q. What do you call ore stains, or what do you mean by ore stains, and what have you meant in your testimony in this case?

A. I have meant by ore stains oxide of iron; the various oxides of iron that may have been formed in this zone, and which are a

guide to the pay portions of the ore. These ore stains will, all of them, assay some little trace, and are the indications of pay-ore.

Q. What colors do the oxides of iron stain the rock?

A. Red, brown, and the various shades of red and brown; among them I will include the carbonate of iron and the sesquioxide of iron, and all of the minerals that are liable to have resulted from decomposition, and which form the stains. The principal stains are red, the sesquioxide of iron color.

Q. What stains the quartzite that you have here, that you have brought into court?

A. The oxide of iron; decomposed pyrites.

Q. The whole of that quartz is much more thoroughly stained with oxide of iron than the limestone, isn't it?

A. No, sir; it is principally stained at or near the contact,
267 and to a greater or less depth, as the quartzite has been disintegrated and decomposed; and the reason that I have for that is that where water has been percolated along it has decomposed it, and where water probably has not run it is very hard and compact, and the iron pyrites are not decomposed. Along the line of the contact, where water could enter more easily, the quartzite is frequently only discolored and stained, and with this reddish-yellow color.

Q. The quartzite, wherever it is exposed to the air, is stained a very deep red?

A. Yes, sir. I have a piece of it here, and if you break off the outside it is whitish.

Q. Showing the presence of iron in the whole body of quartzite?

A. Doubtless the whole body of the quartzite is more or less impregnated with iron pyrites.

Q. How far they extend you do not know?

A. These pyrites have resulted from the same source which put the pyrites into this zone of limestone at that time, but I do not know how far into the quartzite the pyrites extend.

Q. The shale is also stained with oxide of iron, isn't it?

A. Not so much. It is occasionally stained, but rarely; its general color is yellowish and bluish; calcy color, such as you see here [showing].

Q. Did you notice in the railroad cut, about a quarter of a mile east from the Richmond hoisting-works, intercalated bunches of limestone in a shale?

A. Do you mean pure carbonate of lime?

Q. I mean limestone.

A. These white crystals?

268 Q. No, sir. Did you notice limestone in such branches as I have spoken of?

A. I have seen it in various places.

Q. In the shale in the railroad cut?

A. I did not notice these. Do you mean immediately in front of the Ruby Hill tunnel there?

Q. Yes, sir.

A. I think I have noticed there some extravasations of crystalized carbonate of lime.

Q. I am talking about the limestone, not the crystals of carbonate of lime.

A. It is the same thing, chemically.

Q. There is a great variety of limestone?

A. Yes, sir; if you include the marbles; but the essential composition of limestone is the carbonate of lime. It may be discolored by different substances, but limestone is essentialy carbonate of lime.

Q. Did you notice iron in the limestone at the point I have designated?

A. No, sir.

Q. Isn't the whole country, Prospect mountain and the hills around Prospect mountain, very generally colored with iron?

A. Stains of iron are visible on the surface.

Q. Answer the question. Isn't the whole body of Prospect mountain, and the country generally around there, wholly stained with oxides of iron?

A. I think that remark would be too sweeping altogether.

Q. You can say yes or no to it and then explain.

A. I do not think it would be the first thing to be remarked. Prospectors going over the ground would notice limestone and here and there strong stains of iron, which would induce
269 them to prospect; but I do not think it would be just to call it very strongly stained.

Q. The quartzite is stained with iron stains and the shale is stained with iron stains and the country to the northeast of it presents iron stains. Why isn't it all to be regarded as one lode quite as much as this one zone of limestone?

A. The reason why I did not consider it as one zone is because it is divided by this thin stratum of shale, and a coarser stratum of shale, and the impregnation of mineral is very distinct in that zone lying upon the quartzite adjoining the thin scale, going to the northeast.

Q. Are you acquainted with the Austin district, Reese river?

A. I have never been in a single mine in the Austin district. I have been at Austin a number of times.

Q. You are well acquainted with the districts of Freyburg?

A. I was, as a boy, and went into the mines frequently. But I cannot say that to-day I am well acquainted with the mines. I hardly know the names of those that I was in.

Q. The formation in which the mines are found there is gneiss, isn't it?

A. Yes, sir; that is my recollection and reading since.

Q. And different kinds?

A. There are two gneisses. There is the grey gneiss and the red gneiss. The grey gneiss being the metal-bearer.

Q. The other gneiss is a metal-bearer too, isn't it?

A. It is generally barren; one or the other of them is gen-
270 erally barren, and my best recollection is that it is the red gneiss that is generally barren. It is inexplicable, the reason, but one or the other is metal-bearing, and the other is entirely barren; that fact has never been explained.

Q. I suppose the red gneiss bounds the grey gneiss upon one side?

A. I don't know whether it is a continuation or not.

Q. Do you know how many veins there are running through the grey gneiss?

A. There are a great many. To the best of my recollection they call them ganzug, or a succession of little veins. I would like to state here that all of these veins that are spoken of in Freyburg district and vicinity are worked and owned by individuals or by the Crown, and are worked underneath superficial areas.

Q. The grey gneiss must be bounded on both sides by the different kinds of rock somewhere?

A. No doubt it is.

Q. And on one side you know that it is barren?

A. It is probably barren on both.

Q. You have used the term miners' usages and miners' customs two or three times; what do you mean by that?

A. I mean what the miners are endeavoring to crystallize out into form to an accepted definition, or what they would consider a definition; and the best of them are trying now to have determined what shall constitute a lode according to our usages and customs; taking the opinion of various people, it is a progressive art.

Q. It has been progressing rapidly in the last three or four months, has it not?

271 A. No, sir; probably it keeps on progressing; I don't know that its progress has been accelerated in that time any more than usual.

Q. We have here what you call a metal-bearing zone of rock in the Eureka district; while this process of crystallization is going on among the miners in relation to their customs, have they passed any laws in that district by which they recognize that as a zone that may be and should be all taken up under one claim, or not?

A. I think there has been no alteration in the laws since the early times; there is a project on foot now to alter the laws, which I think will be carried.

Q. That project has sprung up since this controversy between the Eureka and the Richmond commenced, as have a great many theories, I think.

A. No, sir; it has sprung up without any connection or knowl-

edge, as far as I know, on the part of any person with this controversy. It was mentioned to me by a man whom I know but little of. I was asked if I would join in it. I did not begin it nor do anything more than to acquiesce in it. It started without my knowledge. It was Mr. Vermuth spoke to me about it.

Q. A gentleman from Freyburg had the present laws adopted, or, at least, the amendments, didn't he?

A. I think he was a Freyburger.

Q. To suit a theory of his?

A. He was groping after the truth as he saw it at that time. He has changed his mind since.

Q. According to the customs and usages of the miners and the mining laws of the Eureka district at the present time, parties are authorized to locate just such ground as that in square claims, are they not?

A. As a matter of strict local law, I think they may. As a
272 matter of custom, having been in disuse for so many years, I doubt the efficacy of such locations.

Q. Every one of these claims now claimed by the Eureka was located as a square claim, wasn't it?

A. Originally I believe they all were, except the Lupita. I think that was not located as a square location. That is my recollection. That was a later location than any of the others. The earliest locations were all located as squares, and soon afterwards the miners became convinced of its doubtful legality; or from some other reason they located them on top of each other as ledges.

Q. You located the K. K. as a square claim, didn't you?

A. Yes, sir; as both a square and a ledge, I think, at the same time.

Q. Under the mining laws of the district they are entitled, if those laws are not in conflict with the laws of Congress, to everything found beneath the surface within their exterior lines?

A. That was the intention of the square locations.

Q. So far as the miners of the Eureka district are concerned then?

A. They have not yet brought their rules and customs exactly up to the mark of claiming that whole zone, or any other zone, as one lode. I don't think they all have. The more intelligent of them have, I think.

Q. Who are some of the more intelligent of them that have done it?

A. I can hardly give their names. You are as well acquainted as I am in the Eureka. I think the great majority there are be-
273 ginning to consider—from the time Mr. King testified about it—that there was a ground ledge through there.

Q. Did Mr. King testify several years ago to a ground ledge through there?

A. He did, somewhere on Ruby Hill.

Q. Mr. King testified several years ago that the Richmond was a lode, didn't he?

A. I believe he did.

Q. Did he go beyond that?

A. My impression is that he did. We have a printed copy of his report here somewhere.

Q. Mr. King did not testify that the Richmond lode had a quartzite under wall with three or four feet of a clay gouge on it and at least ten different ore strata in it, did he?

A. No, sir; because he took the ore-body as the ledge; and he certified that there was silicified limestone underneath; which fact I doubt.

Q. You testified in this case once before, or in reference to the same controversy, and in regard to the same ground?

A. Do you mean recently in Eureka? Yes, sir.

Q. You testified then that the vein-limestone, as you called it, was highly silicious?

A. No, sir; I think not.

Q. Don't you think all of that limestone is silicious?

A. Very slightly; for analyses have proven that it is not so.

Q. Didn't you think it is all silicious, and don't you know it is all silicious?

A. Quite the contrary. The analyses that we have had made have shown but an exceedingly small amount of silica.

274 Q. How much silica does it take to make limestone silicious?

A. That I cannot tell.

Q. Don't any quantity of silica make it silicious?

A. If there was an appreciable quantity it would be, chemically speaking, silicious; but what is known as silicious limestone is such as we can see.

Q. All of that limestone does contain silica.

A. I doubt it. I think the great majority of it contains little or none.

Q. Have you seen a single analysis of limestone from that hill that did not return silica as a portion of its ingredients?

A. I cannot recollect as to the percentage of silica. They were all exceedingly small.

Q. I asked you if you had seen a single analysis of limestone taken from that hill that did not show some silica?

A. I cannot recollect that I saw any such. The quantity is exceedingly small.

[Here the court takes a recess till 2 o'clock P. M.]

AFTERNOON SESSION.

Cross-examination of W. S. KEYES—Continued.

Mr. Wren.—Q. What is the accepted theory about the mode and formation of quartzite?

A. Quartzite—I shall have to give the definition as I understand it. It is, in the first place, either massive quartzite or metamorphosed sandstone, which is nothing but disintegrated quartz; and when quartz, which itself is an independent mineral, is collected together in large masses, it is then regarded as a rock, and is
275 called quartzite. Quartzite may be either massive quartz, or, as I said before, metamorphosed sandstone; that is, hardened sandstone, which has essentially the same characteristics as silicious acid. The general, accepted theory as to its formation is that it is an exudition and accumulation of silicious acid.

Q. I would like to have you answer my question as briefly as possible.

A. I will try to.

Q. I will ask you if the quartzite of Ruby Hill belongs to the silurian period in geology?

A. I believe it does.

Q. Such is the accepted theory—that it is laid down under the bed of the ocean in horizontal strata?

A. I am not positive whether that is the theory or not; it might have been.

Q. You have testified once in this case that such was the theory, have you not?

A. I believe in answering your question if it might not have been so, that I might have said, as I now say, that I believe that that is the theory.

Q. And that the limestone was laid down on the quartzite, also deposited in horizontal strata?

A. I believe so.

Q. And the shale on that?

A. I believe that is the theory.

Q. And then the limestone on the shale?

A. Very probably.

Q. And then shale on limestone?

A. Yes, sir.

Q. And then limestone on shale.

A. If you follow the succession out.

Q. Well, we do follow that succession out on Ruby Hill, do we not?

A. Yes, sir.

276 Q. And then quartzite?

A. I do not know whether quartzite comes again on the north.

Q. Quartzite comes on the northeast, does it not?

A. On that hill—yes, sir.

Q. What is that theory about those rocks being raised to their their present level?

A. Accepting that theory of deposition, which seems to be reasonable, the rocks were raised to their present position in one of

two ways; either by a rapid motion or by a gradual motion. As resulting from either, you can get their present position.

Q. That is, by some force excited from below, they were tilted up and raised to their present position, probably being tilted at some angle more or less steep?

A. A force from below would be sufficient to account for it; a force pushing from the sides would also cause a bulging up of such stratified rocks.

Q. Is it or is it not your theory that those depositions were all sedimentary and subsequently raised to their present position by some great force?

A. I had formed no positive theory on the subject; I am willing to accept the sedimentary theory, however.

Q. What is a lode?

Q. To give you a general definition which would comprehend all lodes, is a difficult matter. It is necessary to explain what kinds of lodes are accepted in books and by authors; and to describe each one I think it is extremely difficult to give, in a single expression, an arbitrary definition which would include them all. The nearest response I can give and include them all, without at the same time binding myself as to a theory of their formation, would be
277 this: an altered zone of rock having more or less definite boundaries and containing ore. I do not think I could give a definition comprising them all in any less general terms.

Q. Is that the scientific definition given in books?

A. It is not the definition that is given in the books in terms, but from a careful study of the books, my inclination is to believe that that is the expression in order to embrace them all. All authors that I know of, while stating that they give their definition, at the same time include a theory of their formation, which seems to me unjust when giving a definition. One's opinion should not govern a definition, but it should be a definition which should govern the case; though, were an opinion asked as to formation, they might give it.

Q. What is the scientific definition of a lode?

A. Will you take any particular author?

Q. I will take Von Cotta.

A. Very well, I will take Von Cotta.

Q. What is Von Cotta's definition?

A. Will you allow me to read it from the original?

Q. I would just as soon as not you would.

A. I will read from the original, as contained in my deposition in this case. Without reading the German, I can give the translation. The translation which I give from the original German is as follows: "Veins are the fillings out of cracks (fissures). This is the best definition that can be given, although it (the definition) presupposes a conclusion (judgment) as to the manner (method) of their formation. Ore veins are, therefore, fillings out of cracks (fissures) which contain ores (or wherein there are ores)."

278 Q. Is the limestone lying between the quartzite and clay seam, you have testified to, the filling of a fissure or crack?

A. As a whole, it is not.

Q. The ores that occur in that zone of limestone are the filling of fissures and cracks, and cavities in that limestone, are they not?

A. Yes, sir.

Q. You find blocks and masses of limestone that have fallen in from the main body of the limestone during the process of filling and are surrounded by ore, do you not?

A. In subordinate fissures—yes, sir.

Q. What is that theory about the formation of fissures and cavities that are found in that zone of limestone?

A. My theory, if I have any, is that this zone of limestone has been by some subterranean, or, at least, terrestrial force, broken, shattered, fissured in an infinity of directions, and that subsequent to this fissuring and shattering, the limestone previously having been shattered or fissured, is, according to the theory of deposition, in strata; and I judge from the finding of thin strata of limestone in other places, that this zone of limestone also consisted of thin strata. This subterranean movement which has broken and shattered and entirely obliterated, or very nearly thoroughly obliterated all pre-existing appearances of stratifications, has caused this infinity of cracks, and my belief and my theory is that metal-bearing vapors have come up from below—because I doubt their having come in at the top—and have permeated all this fissured and broken-up limestone having a mineralized zone. Near the surface these

279 cracks have extended more or less perpendicular upward, giving a chance for the formation of branches, and, in the line of contact, which is the easiest line of breakage, the ores have also made a deposit. This breaking up and fissuring of this zone forms a class of mineral deposits which have been called by Germans "contritions," or, as you may translate it in English, veins of attrition. I might say, according to my theory, that the whole of this zone was more or less mineralized, and as a result that it is a unit that forms the zone in question. Although the majority of the ore in depth, I believe, will be found at or near the contact between the limestone and underlying quartzite; the separate pieces which you find near the surface, under this theory, have been formerly connected by cracks from the subterranean source which have been closed by the resolution of carbonate of lime filling up the cracks as they originally existed.

Q. You made an affidavit in this case, did you?

A. Yes, sir.

Q. What you state now contradicts, point blank, what you swore to in your affidavit, does it not?

A. I do not think it does; I object to being bound to any theory at all. My affidavit stated general conclusions that might result from facts.

Q. I understand you to state now that the limestone was broken up in every conceivable direction through that whole zone?

A. I think it was mainly broken up; at least the stratification was entirely obliterated.

Q. You don't mean to say, then, that the limestone was broken up throughout the vein?

A. Certainly, I mean to say that the limestone was broken up.

280 Q. In every direction?

A. As we see it at present it is very largely broken up, although I should not think in every direction.

Q. And you think that those little seams that were made by this breaking-up process were subsequently filled with ore?

A. I believe that is the reasonable theory.

Q. Is that what you say at the present time? There is no theory about that. It is matter of fact; for it either is or is not so.

A. There are a great many of them that have no ore at all.

Q. A great many of what that have no ore?

A. In this infinitessimal number of cracks or breakages.

Q. A great many of them have no ore?

A. Yes, sir.

Q. You used this language in your affidavit, did you not?—"That the contained matter has been altered, metamorphosed, and deprived of its stratification, is evident to the most superficial observer. That it has barren spaces corresponding to the inclusive "horses" of the Comstock, is a fact it is undeniable, but which does not militate against the theory of a contact vein having the limits of mineralization bounding by the overhanging clay shale."

A. Yes, sir.

Q. You said that?

A. Yes, sir.

Q. Did you use this language?—"The vein of limestone is sometimes broken up like thoroughly shattered glass, showing the minute cleavages in every possible direction, and still again, it

281 appears hard, compact, and devoid not only of any traces of stratification, but even of any sign of cleavage."

A. Yes, sir.

Q. "This latter phenomena marks the barren streaks between ore chutes or chimneys."

A. Yes, sir.

Q. Is that the fact—the statement which you made in that affidavit?

A. Yes, sir.

Q. Those barren spaces are of very considerable extent, are they not?

A. They are of considerable extent in every mine.

Q. There is at least 100 feet of limestone in that zone to one foot of ore, is there not?

A. I never figured it out, but I should think there was, however.

Q. Do you think that there was any dissolving of ores from the smaller fissures and its subsequent deposition in the chambers and fissures lower down after the first formation of ores?

A. I have no doubt that the fissures originally made were enlarged by solutions of carbonic-acid-bearing waters.

Q. You don't complete your answer in relation to the formation of the fissures and cavities. What is your theory about the formation of those large cavities or large chambers in which the ores are found?

A. I think a reasonable theory would be to suppose that it had been the result of dissolution of the carbonate of lime in which the ore subsequently intruded.

Q. Carbonate of lime dissolves very readily when it comes in contact with water charged with carbonate acid, does it not?

282 A. Very readily.

Q. What is your idea about waters as containing carbonic acid having come up from below throughout the fissures that were made in the limestone?

A. The carbonic acid waters may have resulted from a deposition of pyrites forming sulphate of lime. The carbonic acid would then be set free. The coming in of the water in it from any source, above or below, might carry sufficient chemical force with it to decompose the pyrites, and the decomposition of the pyrites would react upon the carbonate of lime, making free carbonic acid, which would be competent to form these solutions. I do not know whence the carbonic acid might have come. It could have resulted in the bed of the limestone, or, it might be, some force may have forced it in from some other source.

Q. Let me see if I understand your theory about the formation of the vein. It is, that the limestone was fissured by forces raising it to its present position; that subsequently waters penetrated the fissures charged with the ore material that you find deposited there, and that ore material was deposited from those waters where we find it. That is the theory?

A. In general terms.

Q. How would, or how did, any portion of that zone of limestone become a part of the lode? How did any portion of it not charged with the metals become a part of the lode by that process?

A. The fissure, if there be a fissure, as its most natural point, is at the contact, and the extending of these mineral vapors up a certain distance forms a mineralized zone. My opinion is, they started from the same source, and as they approach the surface they

283 leave the line of contact, or contact vein, up which they may have come, and I believe did come, and penetrated into the overhanging rock, and form, in this way, a mineralized zone, which I take, properly, to be part of the main lode.

Q. You have used the term "contact vein" a number of times. At what point do we find contact veins?

A. The junction of the limestone and the underlying quartzite.

Q. Your idea, then, is that along the line of contact, between the limestone and quartzite, a contact vein exists?

A. Yes, sir.

Q. What sort of a vein is the limestone that lies away from that line of contact?

A. It lies away from that contact, forming a portion of the metamorphosed mineralized altered zone. I denominate that lode in the same way that Professor Von Cotta denominates the clay schists of Hartz.

Q. Is there any resemblance in the world between Von Cotta's description of the clay schists of the Hartz and the limestone zone on Ruby Hill?

A. There is a resemblance as great as can be expected between two different rocks.

Q. Wherein? Point it out.

A. Will you allow me to read Von Cotta's description?

Q. I have no objection.

A. He says (Prime's Translation, p. 153, eighth line above foot note), speaking of the District of Clausthal:

"*The same consists principally of clay slate and sandstone, of the sub-carboniferous.*"

And on page 155, Prime's Translation, eighth line from top, speaking of the Sibernaaler Group, same district:

234 "*The whole group consists essentially of but one lode, whose breadth varies from one to fourteen fathoms. Its matrix is predominantly so-called Gangthonschiefer (vein clay slate).*"

Foot-note on same page reads:

"*According to a careful examination made by the author in* 1864, *the Gangthonschiefer is nothing more than a portion of the wall rock (clay slate) which has been altered and impregnated with ores.*"

Prime's Translation, p. 156, tenth line from top:

"*The Zellerfelder Group forms a principal fissure between Wildermann and Zellerfeld. * * * The gang is principally composed, with a breadth of 6-17 fathoms, of vein clay slate, calc spar, and quartz.*"

Prime's Translation, p. 157, first line:

"*The Lautenthaler Group is the most northerly of all. It consists of one champion lode, 17 to 23 fathoms broad, which splits up into numerous leaders. * * * Its principal vein stone is again vein clay slate, with chimneys and pockets of quartz, calc spar, galena, blende, and copper and iron pyrites.*"

Prime's Translation, p. 157, sec. 106, speaking of the Western Hartz, he says:

"*The fissures, often many fathoms broad, are, for the most part, filled with fragments of the wall rock, especially clay slate (which is then called in Clausthal vein clay slate). Perhaps it would be more correct to*

say, that many single fissures have cut through the rocks in zones; that these zones have been disturbed and now appear as a kind of fissure matrix; that the fissured slate has, at the same time, been altered in some degree by water or vapors, and is distinguished as so-called vein clay slate from the common clay slates."

285 Q. Von Cotta states that where the clay slate forms a matrix the fragments of it have fallen into the fissure and have been altered. Has that zone of limestone fallen into a fissure?

A. That zone of limestone is not itself a fissure, nor have I ever claimed that it was a fissure.

Q. That zone does not consist of fragments of the limestone that have fallen into a fissure?

A. It is the zone itself, which has been broken and altered, and metamorphosed and impregnated with mineral.

Q. That is, portions of it have been pregnated with mineral?

A. Portions of it impregnated with mineral, and the metamorphosis is apparent, because the stratification has been so almost univesally destroyed.

Q. Horses of the country rock, the fragments and the country rock that have fallen into the fissure during the process of the filling of the fissure with ore, or at any time, that have been surrounded by the ore gangue, are considered as a part of the fissure, are they not?

A. They are considered as a part of the lode.

Q. In the other case is the country rock ever considered a part of the lode?

A. I don't think it is ever considered a part of the lode, except as it is inside of the subordinate fissurings.

Q. Country rock never occurs as a part of the lode and never forms a part of the lode except where it has fallen into the fissure, and forms what is termed horses, or possibly exceptional cases, where the fissure is separated, where it is forked and come together again, leaving the country rock forming a horse between the two

286 branches of the fissure. Those are the only cases in which country rock can ever be any part of the lode, are they not?

A. Only when within the fissures.

Q. The rock there is not within the fissure, that zone of limestone, is it?

A. The fissurings have been confined to that zone, and the number of fissurings is very great.

Q. The fissurings have been confined to that zone?

A. That zone is the only one which bears this evidence of metamorphosis which we have observed at this place.

Q. You did not answer my question precisely. Is that zone the only one that exhibits evidence of fissuring and breaking up, such as you have described?

A. At that point, yes, sir. I don't know of any intermediate.

Q. Is not the quartzite broken into a hundred pieces where the limestone is broken into one?

A. In the drifts driven into the limestone we find it crystallized.

Q. Does not it show in every direction little fissures running through it, a result of breakage, owing to some force which has been exerted upon it? Take the piece of quartzite which you have exhibited here; is it freshly broken at any place?

A. Partly in one or two place. It is mainly old breakage.

Q. Old breakage?

A. Mainly.

Q. The quartzite is all in that condition, is it not?

A. A great deal of it is; the larger portion of it is.

Q. And it is stained with iron through that wherever you have seen it?

A. No, sir; when it is close by the contact it is stained with iron; away from the contact it is not.

287 Q. Is it not stained with iron 60 or 70 feet away from the point of contact, where rock has been taken out to be smelted?

A. In many places the stains extend further than 60 or 70 feet. In many places it is so hard that we have to blast it.

Q. If the fact of that rock is broken and shattered tends to establish the theory that it is a lode, then that quartzite must be a lode, must it not?

A. If that fact were taken alone, you might denominate that quartzite a lode.

Q. Because broken and shattered?

A. As far as that is concerned. But you need more than that to term it a lode.

Q. In determining the question of lode or no lode, is not that an entirely immaterial consideration?

A. The fact of it being a fissure?

Q. The fact that the rock is broken up or not broken, compact or not compact. Do you not find rock that does not contain a trace of ore—an abundance of it in all those districts—that has been subjected to great disturbing force, that is broken in every shape?

A. Most assuredly those things may be found; but you don't find ore in it.

Q. You say that has been metamorphosed?

A. Yes, sir.

Q. Is not that entirely immaterial in considering this question of that being a lode or not a lode?

A. No, sir.

Q. What has metamorphism to do with the formation of a lode?

A. Metamorphism signifies simply a change in the me-

288 chanical characteristics of that zone; and that change of mechanical characteristics is according to whether it is brought about by its mineralization; and the very fact of its being metamorphosed is real proof to my mind that this change was due to these intrusive matters that we see up there—mainly foreign

bodies, iron and so on—and that forms the ore that constitutes a lode in its entirety.

Q. The quartzite is metamorphosed, is it not?

A. It is metamorphosed at or near the contact in many places.

Q. You testified only a very short time since that quartzite was metamorphosed sandstone?

A. I said that was one species, and massive quartz was another.

Q. Massive quartz is a species of quartzite?

A. No, sir. Quartzite, as we use the term, is to be ascertained in two ways. One is massive quartz, and the other is sandstone which has been metamorphosed, altered and compacted. When it is comparatively smooth, but considerably disintegrated and rough, with small grains, we call it sandstone.

Q. Quartzite is granular quartz, is it not?

A. It is granular quartz; massive quartz and altered sandstone. Sandstone itself is granular quartz.

Q. Quartzite is massive quartz?

A. I take that to be the proper definition.

Q. And the quartzite has been metamorphosed?

A. At the contact it has been metamorphosed.

Q. Has it not been metamorphosed away from the contact?

A. I don't think so, necessarily.

Q. Was it not wherever drifts have been run away from it?

A. It is plainly quartz. It looks like quartz, and is
289 plainly quartz. We have quartzite in it, but not in the body of it, I think.

Q. Why is not the quartzite a portion of the lode, if it has been metamorphosed?

A. Because it contains no ore; and what mineral substances it contains are different from those contained in this zone.

Q. Do you say there is no ore in quartzite?

A. No ore of any value.

Q. Does it require ore of value in order to make a lode?

A. It does not require that there should be any ore of any account in it to make it in the widest sense a ledge or lode. We speak of a ledge running up the mountain-side; we often speak of veins of intrusive rock which contain no suspicion of valuable ore.

Q. Do you know of any book that was ever written on mining geology in which a theory such as you have given here is laid down upon the formation of veins?

A. I think that such a theory is a legitimate conclusion from the reading of Prof. Von Cotta. He starts out with an arbitrary definition of a vein, and as he proceeds he shows a great many variations from it. He states particularly that a unit—that is, an example of one of the various forms of veins which he mentions—in its entirety, pure and simple, is rare and difficult to find; that they generally run into one another; that the phenomena and appearances are combined. He states still further that this definition it-

self is very vague and very general. And this matter of determining what is a lode or what is not a lode, is, in my judgment, a matter of progress. As we gain in the light, we come more nearly toward the proper definition. I know of none of the European authorities that give the definition except with a great deal of explanation, and with a view to alter, explain, and enlarge it, as far as investigations in chemical geology shall extend.

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Q. You have progressed a little on Von Cotta?

A. I don't think I have.

Q. Your evidence differs in some very material respects from your affidavit.

A. I can't see that it does.

Q. There are some reasons that you give in your affidavit for considering that vein a lode that you don't give now?

A. I may have overlooked them.

Q. In your affidavit you stated that clay seam was found in the Hamburg, two or three miles south of these mines, did you not?

A. I said that in the Hamburg there was similar shale found.

Q. Did you not state that some vein was found in the Hamburg, two or three miles south of this?

A. I don't think I stated positively it was the same. I cannot prove that it was the same. I merely know the shale looked similar. I cannot say it was the same. I cannot tell that at all, it is a matter of actual demonstration.

Q. You stated that the Dunderburg and Hamburg were all situated in the same zone of limestone, did you not?

A. I stated my belief that they were all in the same vein?

Q. You stated positively that they were.

A. I think not, positively. Because it is a matter of opinion and belief. They are in the same direction, and I stated I believed they were on the same vein.

Q. Do you believe so now?

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A. I believe it.

Q. What is a contact vein?

A. It is a vein at the junction of two dissimilar formations—different rocks.

Q. Did you use this language in your affidavit?—"This clay wall has subsequently been found in the Hamburg as well as in each and every one of the Ruby Hill series of mines."

A. I believe I used that language.

Q. You also stated in your affidavit, or in one of them—you made two—that there was no ore found in the zone of limestone, immediately northeast of the shale, did you not?

A. I stated no pay-ore, I think.

Q. Did you not state that there was no ore or mines?

A. I stated that there were no mines, and my impression is I stated there was no pay-ore. If I stated there was no ore at all, I would like to correct it.

Q. What do you think about the Richmond lode? Do you think that is a contact vein?

A. I think there is a large amount of ore on contact yet to be found in the Richmond mine, and I believe—

Q. [Interrupting] I wish you would answer my question, if you please, directly, if you will. I will ask it again: What do you think about the Richmond lode? I don't mean something that might possibly be developed; I mean what has been worked.

A. Up to the present time?

Q. Yes, sir. Do you regard that as a contact vein?

A. It is a branch of a contact vein, I believe.

Q. Is it a contact vein?

292 A. As far as we have extended it is not a contact vein, because it is not on the contact. At the lower portion of it it is on the contact; the deeper it goes, in my opinion, the more will it be resting upon the contact.

Q. That is merely a matter of conjecture, is it not?

A. It is not entirely conjecture. For we find a portion of the body resting on the contact now at its lower portion; and from the developments upon the contact underneath the Eureka 9th level and southerly from the winze between the 6th and 7th Richmond, I believe that the ore will unite, and the ore of the Eureka is on the contact.

Q. You have testified that you have seen it on the contact, have you not?

A. Yes, sir.

Q. In your affidavit you stated it a little stronger than you have stated it in your testimony now, did you not?

A. As to what?

Q. The ore in the Eureka being away from the quartzite or away from the contact.

A. The ore in the Eureka is found both on the contact and away from the contact.

Q. Are there any matters material to be considered in determining the limits of ore-bodies found, such as those on Ruby Hill, except simply the enclosing rock?

A. I think it is necessary to take in view the whole surroundings in order to arrive at the conclusion as to whether it is one lode or many lodes.

Q. All these facts you have been testifying to you think have occurred?

A. I think they have occurred.

Q. Do you know what Von Cotta calls segregated veins, or segregated deposits rather?

293 A. I have read his description of segregated deposits.

Q. What is his description of segregated deposits?

A. I cannot give the exact phraseology, but I think the expression explains itself.

Q. Let me see if I can't refresh your memory. Does it not say that segregated deposits are irregular, or is ore having no apparent connection with each other, found either in or near the line of contact or dissimilar formations?

A. There is such a class of deposits, which Von Cotta denominates contact segregations, and the question is whether those should be regarded as contained within a lode or forming a zone.

Q. That is, he could then contact segregations?

A. I think that is the exact expression. I was looking at his work yesterday, and that is my recollection.

Q. He does describe that as ore-bodies called segregations?

A. Yes, sir.

Q. The gangue of these ore-bodies is very frequently iron, is it not?

A. That is a non-valuable portion; the iron itself is the carrier or ore bearer.

Q. Is the iron the gangue?

A. It might be denominated as gangue.

Q. Have you ever seen it denominated a gangue?

A. I don't think that I have in this case.

Q. You say you think you have never called it a gangue in these ore-bodies on Ruby Hill?

A. Possibly I may have.

Q. Do you consider it a gangue?

294 A. A gangue of the ore-body? Yes, sir; I do. I do consider it a gangue of the ore-body, but not the gangue of a lode; because it is an indication of valuable or pay-ore, itself not being valuable.

Q. Von Cotta states that that class of ore-bodies occurs either at the line of contact or near it, in limestone partly, does it not?

A. He mentions that such occurrences are usual and common.

Q. Owing to the fact that the lime is easily dissolved over the limestone by waters falling through the crevices, the cavities or fissures in which ore is found in limestone are usually more irregular than they are in other formations?

A. Only from the easy solubility of the limestone.

Q. Did you ever hear of a pipe-vein?

A. I have heard what they call pipe-veins, and I have heard it spoken of in Eureka quite recently.

Q. What is a pipe-vein?

A. I think that, properly speaking, a pipe-vein is nothing but a local expression used amongst the miners in Devonshire and some other counties in England, and is only applicable to those bodies of ore which are to be found in stratified rock. It is a local expression only used there. I don't think it has become a recognized term in economical mining descriptions.

Q. You have not answered my question at all. I asked you to describe a pipe-vein.

A. To describe a pipe-vein, I must describe the locality where it occurs; and, as far as I have been able to find out, the only places where they do occur are in England. Bodies of ore are all connected by stratified rock. The rake-veins have filled fissures
295 crossing the pipes at the points where they join with the flat or bedded veins.

Q. Let me ask you if a pipe-vein is not described by the best authorities as an irregular pipe of ore descending into the earth at a steep angle, with comparatively a very short course, of considerable thickness and great depth?

A. That is not my understanding of the description at all.

Q. Did you say pipe-veins only occurred in England?

A. That is the only place where I know of their being described, and, indeed, the only place, aside from rock in that region, where the term has been applied.

Q. Have you ever read any English works on geology?

A. I have looked over Phillips, which describes the same place. I don't know that I have looked over any others.

Q. You never have read Juke's?

A. No, sir.

Q. What is a vein of attrition?

A. A mineralized zone which has been broken up.

Q. Is that the description which Von Cotta gives of veins of attrition?

A. That is the idea of it. I don't remember his precise words.

Q. Have you ever read Prof. Whitney?

A. His Metallic Wealth?

Q. Metallic Wealth of the United States.

A. Yes, sir; I have looked it over.

Q. Is that the definition he gives of veins of attrition?

296 A. I don't remember his definition. He mentions them as a subordinate variety, and my recollection of it is, a broken zone which is impregnated with ore.

Q. Is not this the definitionhe gives, and Von Cotta also: that under the form of the fissure the walls are moved up and down upon each other, and by the movement the rock descending into the fissure is broken up into fragments, and forms, in that way, after the filling in of the ore, a portion of the filling of the vein. Is not that the precise description given of the vein of attrition?

A. I don't remember that that is the precise description. Such a formation would, in my judgment, properly be called a vein of attrition.

Q. Are there any other kinds of veins of attrition?

A. I think such an example as we have here.

Q. Has there been any such movement as that in the line of fissures on Ruby Hill?

A. In my judgment there has been no such movement, but a

lateral pressure or grinding motion from below or the side, which makes the matrix of the fissure the same way.

Q. You have repeated here, in substance, precisely what Prof. Raymond included in his affidavit after you had made your affidavit, have you not?

A. In making my affidavit before, I designedly did not accept any theory. I made my deductions from the facts, and I am content to accept Prof. Raymond's explanation.

Q. Are not Prof. Raymond's affidavit and yours in direct conflict with each other on several matters of fact as well as theory?

A. I believe there are some variations in theory. He did not make any I would not accept. But I based my deductions
297 on the facts as I saw them; if my deductions were wrong, I at least intended to state the correct facts.

Q. Have you not, since you saw Prof. Raymond's affidavit, adopted his theory as a much better theory to support the case than the theory advanced in your affidavit?

A. I stated plainly that I wished to avoid as far as possible any enunciation in theory. The theory that Prof. Raymond has advanced seems to me sufficient, as far as it goes, to account for a good many of these phenomena, and he having a greater acquaintance with theoretical matters than myself, I am willing to accept it.

Q. Then I understand you to say, in effect, that you modified your opinions expressed in your affidavit, upon reading Prof. Raymond's affidavit, so as to make your theory and Prof. Raymond's correspond?

A. No, sir. But finding the theory which seems to me tenable, I am willing to accept it; not, however, changing the facts. Two observers, looking at the same facts, may adduce entirely different theories. All I desire is to ascertain the correctness of the fact, and then base the theory only on the fact.

Q. Have you not admitted that a change of the facts were absolutely necessary in order to support Prof. Raymond's theory; that Prof. Raymond's theory cannot be sustained unless it is a fact that the limestone is broken up and fissured in every direction, and not compact and hard, and showing signs of fissuring, which you have testified to?

A. It may have been rehardened after having once been broken. I propose to let Prof. Raymond defend his own theory. I don't propose to be bound by any theory, myself.

Q. I desire to know if you have adopted his theory?

298 A. If I have, I am unconscious of it. You seem to insist on my making a theory, which I don't desire to do.

Q. What are cleavage faces?

A. Planes of breakage; smooth cracks.

Q. Give us an example of rock in which planes of cleavage are found.

A. I think that I have, unintentionally, probably, misused to

some extent that word cleavage. Cleavage is a line of break which follows what may have been crystallization or stratification; as, for instance, we take a piece of spar and set it on one side and strike it with a sharp instrument, when it scales off in plates. That makes a line of cleavage. I have misused the term before.

Q. Is there any such thing found in limestone as cleavage faces?

A. It is not a common expression to describe these breaks and fractures.

Q. Is there any such thing found in limestone as cleavage faces?

A. Certainly there are; the lines of stratification.

Q. The lines of stratification of the limestone are cleavage faces?

A. They are faces of cleavage; that is correct.

Q. You stated in your affidavit that the apparent walls found in the Richmond mine were cleavage faces, did you not?

A. I did; and I wish to—

Q. [Interrupting.] Now you wish to take that back?

299 A. I do. It was a misuse of language. They are breaks. Cleverages faces, in my judgment, simply refer to lines or stratification of crystal.

Q. The apparent walls which you find in the Richmond, then, are simply breaks?

A. That is all. The longer breakings or fissurings which have taken place in this zone.

Q. Do you say it is a fissure now, or longer breaks of fissures that have occurred in this zone?

A. Fissurings. If the breakage was only a quarter of an inch long it would be of the same character.

Q. Then you would admit that is a fissure found in the Richmond?

A. Of the same class and character we found in a multitude of other instances.

Q. Do you admit that is a fissure?

A. I do.

Q. It has a smooth face, has it not?

A. Those which are perpendicular have smooth faces.

Q. And marks of striation?

A. There are marks of striation or movement, I think; sometimes upward and downward; sometimes horizontal and sometimes quite smooth.

Q. The ore is found lying between them?

A. The ore is found lying beneath and behind them.

Q. Why did you not regard that fissure-vein as a fissure-vein of the Richmond; as a lode in the fissure?

A. For the reason that every one of the fissures or fissure-claims, as the counsel denominates them, when they have been followed to their furthest extent, reach down to or up to one or the other of the bounding formations.

300 Q. Will you confine yourself to the Richmond fissure?

A. I found this smooth break in the Richmond mine ex-

tending downward in the direction of the course of the channel, and dipping towards the underlying quartzite. I presume you mean the longest ones. I find them not perpendicular, one over the other, but some distance forward and downward as well as further forward. If those fissurings or these breaks were followed, my opinion is that they would extend to the quartzite. They had not been followed as far as the quartzite that I know of.

Q. Do you mean extend to the quartzite in depth?

A. I think they would or go out entirely. And the reason why I don't think these form fissure-veins is because they don't penetrate through the underlying quartzite or the overhanging country, including the shale or the stratified limestone. These planes or breakages following one another downward, if they are the result of the force directly below, would have fissured the underlying quartzite certainly, if not also the overhanging country. But I have not seen the underlying quartz fissured, and for that reason I don't expect these lines the breakage as the walls of the lode, for they don't extend through this, they are local.

Q. They never have been followed to the northwest to determine whether they run out or not, have they?

A. Not in the Richmond.

Q. As far as they have been followed to the northwest they have not run out?

A. In their course they have, as far as I have seen.

Q. Then you don't know whether they don't when they reach that so-called shale, or not, do you?

301 A. The main fissures would not reach the shale if the course was continued.

Q. They run about northwest and southeast?

A. Yes, sir.

Q. And the shale runs about the same course?

A. Yes, sir.

Q. So in running northwest it would have been a long distance before the fissure reached the shale?

A. It would be a long distance if it ever reached it at all.

Q. Then to the northeast they never have been found to reach it?

A. They have not pursued them far enough to determine it one way or the other.

Q. And in depth they have not run it?

A. I have not followed them down to see.

Q. Didn't those fissures conform very nearly in dip with the underlying of quartzite?

A. I think generally they do not. They have a greater angle, the steeper angle. They certainly do not at other points. What they may do at the Richmond I don't know and can't tell. I never have seen any underlying quartzite underneath it there.

Q. You don't know, then, whether they conform in dip and underlying quartzite or not?

A. I don't know.

Q. If the Richmond fissures in which the bodies of ore are situated, running northwest and south, were to continue to the southeast, what would—they would strike against that quartzite, would they not?

A. They would strike against quartzite there.

Q. That run north; at right angles?

A. That run north and at right angles.

302 Q. The probabilities are, then, that the fissure would end when it struck the quartzite, striking at nearly right angles?

A. If continued far enough there it would reach the quartzite.

Q. And probably end there?

A. If it did end there it would correspond with our theory.

Q. That is not the question I asked you. The counsel will argue this case after the evidence is in. I simply want the facts. Would it not probably end at that point?

A. From observation at other places, I certainly think it would end at that point.

Q. It would be impossible, then, from developments made up to the present time, to determine what is the length of the Richmond fissure or the fissure that appears in the Richmond, is it?

A. It is impossible to say with certainty. But now that I recall it, my recollection is that a fissure or break at the third level goes to about 150 feet to the southeast.

Q. On the third level of the Richmond?

A. Yes, sir; that is my impression.

Q. I would like to have you mark a point on the map, as nearly as you can, where that fissure ends on the southeast of the 3d level.

A. Will you allow me to look at my note book?

Q. Certainly.

A. [After examining note book.] I find I am mistaken as to the level.

Q. As a matter of fact, there is not any 3d level in the Richmond that runs south?

A. Not very far. I made a mistake. It is the 4th level

303 I mean, where there is a very long line of breakage which is described as 150 feet. My recollection is that it runs or disappears to the southeast.

Q. There is the 4th level on the map. Do you know whether it disappears at that point or not?

A. I think that is the point.

Q. Mark it. [Witness did so.] Your impression is that the fissure ends to the southeast at the point marked?

A. That is my recollection.

Q. If it is on any other drift that would be about the position, would it?

A. Somewhere in that portion of the mine.

Q. In answer to a question of mine on that previous examination

in relation to these same facts, at Eureka some months ago, if you recollect, you stated to me that there was a bed of limestone 2 or 3 miles in width and 50 or 60 in length—miles in length—where such deposits of ore are gathered through the limestone, in your opinion it would constitute a lode, but not for practical purposes. That was your answer?

A. You have very nearly expressed it.

Q. And you also said that in your judgment the whole prospecting of Prospect mountains might be considered a lode, but not for a practical purpose?

A. Taking it in that bird's-eye view of it all.

Q. And yet this particular bit of bearing rock ought to be considered a lode for practical purposes?

A. For the reason that the ore extends in places from side to side.

Q. Did you give any such reason as that to the court?

A. If I did not that is the reason.

Re-direct examination:

Mr. Thornton.—Q. You were asked by Mr. Wren about
304 the location of the K. K. mine. That is a personal matter, and has no connection with this case, but I wish you would give any explanation you see fit, in regard to it.

A. I desire particularly to make an explanation on that point, and that point alone. The location of the K. K. mine was made by myself and by my foreman many years ago; outside of a point the farthest claim that the Eureka Consolidated had, or ever had, or, ever in my judgment, could have had. There was a brush fence marking and defining the limits of the ground claimed by the Eureka Consolidated, whose servant I was. The location of the K. K. claims was made by myself and foreman, as I stated before, outside of the utmost limit of the outermost line of fence marking the claims of the Eureka Consolidated. I was aware, and am aware, that the location, as made by the original locators, did not extend within a very considerable distance of this fence. Respecting, however, the shadow of claim, even the utmost shadow of claim, that the Eureka had or might have had, the locations made by me at that time, and the only location made by me in that immediate vicinity, were made outside of and beyond the very utmost limits that the Eureka Consolidated ever did or could have claimed. The remainder, 20 or 25 chains belonging to the K. K., are, with very few exceptions, purchased claims. These claims have been purchased under my administration, for, as I suppose, good and sufficient reasons, to cover the ground. The only locations made anywhere near the Eureka Consolidated were those I have mentioned of the K. K., and one or two old locations on the same place and same spot. No locations were ever made by me near the
305 Eureka, and even these were made by me far from any place they might have any claim to whatever. That some of

the extremely western portion of the Skylark, to which reference has been made here, are in front of the same lode as the Eureka, I do not doubt, I do not deny, nor ever did deny. These claims were offered the Eureka Consolidated Co. for purchase, and refused; and, having been refused by the Eureka Consolidated Co., the K. K. bought them.

Q. For what purpose did the K. K. Co. buy them?

A. They bought those claims because they thought they were useful, and the Eureka Consolidated didn't want them. The K. K. thought they might be useful for the purpose of dumping or sinking shafts, and it is now proposed to sink the Skylark shaft.

Q. They are, in fact, sinking the Skylark shaft at the point you mention, are they not?

A. The Skylark shaft is sunk at a point some distance north of a point marked Skylark on the map, I think.

Q. Why was that shaft sunk at that point?

A. It was sunk at that point in order to prospect, in the hopes of finding something. It was a purchased claim belonging to the K. K. Co.

Q. Did you say that any ore had been found in that shaft?

A. There has no ore been found in the shaft proper. In the first drift run off from it, at a depth of, I think, 425 feet from the surface, that drift being run off to the southeast, found some small benches of irony matter.

Q. How large were those benches?

A. I don't think they were more than 2 or 3 or 4 feet in diameter. They were small. That is the only place in that shaft where, to my knowledge, anything resembling ore has been found.

306 Q. That was northeast of the shale?

A. That was northeast of what we claim to be the dividing line of the shale.

Q. What is the other claim that is located to the north or northeast of the shale, which you mentioned to Mr. Wren?

A. I don't think I mentioned any other claim to him.

Q. The one he mentioned to you, then.

Mr. Wren.—That is the one that lies between the Eureka hoisting works and the Skylark.

The Witness.—A. It is the May claim. Mr. Wren did not give the name when he questioned me concerning it, but simply asked as to the locality. At the shaft in the May claim, which is considerably to the north of the place where this thin shale exudes, there is some low grey iron ore. I never knew of any ore of value being obtained out of that. It was a shaft some 18 feet in depth when I dug it. It has been sunk some distance farther. I don't know how far. The work that has been done is assessment work, to keep the claim good.

Q. How deep is it now?
A. Probably 25 or 30 feet.
Q. What amount of ore has been taken out of it?
A. No ore has been taken out of it to my knowledge.
Q. But there was a streak or seam or irony matter there?
A. There was.
Q. Mr. Wren read your first report made at the time of the purchase of the Richmond. Do you wish to make any statement in regard to this?

307 A. In regard to that I would say that I was new on the ground. I was stating the facts as nearly as I could discover them, and stating such a theory as the facts then warranted. Amongst other things in that report I stated that the Richmond was an intermediate ore-body of an intermediate stratum, which would seem to imply I did not consider it the same as this, lying on the quartzite, or near the quartzite at the Eureka. It was here, up the hill and quartzite below; there was at that time no workings, I think, done on the quartzite. All reports made at that time, and deductions from the facts at that time, must be viewed by the lights that we could obtain at that time. Additional facts, however, would change, and probably have changed, the general theory in some respects; and probably would change it.

Q. What do you mean by the cap of limestone being a few feet thick?
A. I refer to the thin limestone which was over the surface body at the Buckeye. It has since been removed, as stated in the examination-in-chief. The whole ore visible at the Buckeye was a small cropping, but it has since widened out to its present enormous extent. It was very thin then.
Q. How did the cap of limestone lie there?
A. Immediately on top of the iron and iron ore; it lay right on top of it, down the hill; it was on the hill-side, but different developments have shown to have been very thin, only a few feet thick.
Q. It passed on against the general body of limestone, did it not?
A. It passed on to the general body of limestone here up the hill, and it was very much thicker up there.

308 Q. At the time of your report in 1871, you described the quartzite as the foot wall of these locations. Why didn't you describe the shale hanging wall?
A. Because it had never been discovered or known. I did not discover it until two years after that time, when superintendent of the K. K. I knew nothing of it at the time of that report; I didn't know it existed, consequently I could not describe it.
Q. You answered Mr. Wren as to the time when you first considered this a ledge or vein. When was it you considered it one?
A. When I first succeeded in finding what I thought a well-defined hanging wall and ore-body in the K. K.
Q. Was that subsequent to the trial between the Richmond and

Eureka Consolidated, at Eureka, Nevada, and since Mr. King testified?

A. My impression is, it was found subsequently.

Q. You have answered Mr. Wren with regard to the testimony of Mr. King; do you remember what Mr. King said in regard to this being a lode in its linear extent?

[Question objected to as hearsay. Objection sustained.]

Justice Sawyer.—Q. How far north is the ore in the Potts chamber of the croppings found at the Champion?

A. About 900 feet; it is pretty near 1,000 feet; between 900 and 1,000 feet. The squares on the map are, I think, 200 feet apart.

Mr. Garber.—Q. You mean northeast?

A. Northeast. The judge asked me the distance from the croppings to the ore in the Potts chamber. It is about 1,000 feet horizontally, and about 1,600 feet on the dip of the quartzite; probably it might be a little more. I have some more samples here.

309 Number 74 is brecciated limestone from the Phœnix claim, consisting of fragments of limestone, more or less closely connected together by a calcareous exudation. Number 75 is hard limestone from the eastern end of the K. K., second level, at or near the point marked 2 F. Number 76 is what I have denominated shattered limestone. Number 77 is what I have denominated slightly stained, from about ten feet beyond 76. Number 78 has a deeper stain than in 77. I have been unable to find that 78. Numbers 79 and 80 are a few feet farther on and are low-grade ores. These are my own number and the same series. Number 11 of Mr. Donnelly's numbers is soft, sandy lime from the ore chamber, about the 5th level. Number 12 is soft, sandy lime 75 feet west of winze to 6th level and near the contact. Number 13 is brecciated limestone from left perpendicular of first level of Eureka Consolidated. Number 14 is slightly stained limestone from the 9th level of the Eureka Consolidated, 110 feet from the ore-chamber marked E. Number 15 is a stronger stain. Number 16 is a still stronger stain. Number 15 is 60 feet from the ore-chamber. Number 16 is 36 feet from the ore-chamber E. Number 17 is soft, sandy lime, on contact. Number 18 is hard limestone on the surface.

310 THIRD DAY—CONTINUED.

ROSSITER W. RAYMOND sworn.

Direct examination:

Mr. Thornton.—Q. Where do you reside?

A. Brooklyn, New York.

Q. What is your occupation?

A. Mining engineer.

Q. Where did you study the profession of mining engineering?

A. At the University of Heidelberg, Polytechnic School of Munich, and Mining Academy of Freiberg.

Q. When?

A. In the years 1858 to 1861.

Q. Describe your practice and experience in your profession since that time.

A. After a short interval of service in the army, I commenced the practice of my profession, I think at the end of the year 1863, in New York city, as consulting engineer, and have been in active practice ever since. From about the year 1867 I have been editor of the Engineering and Mining Journal, which is the organ of the mining and metallurgical profession in the United States. From about the year 1869 I have been a member of the faculty of the University of Pennsylvania, in connection with the mining school attached to that college, and lecturer on the subject of mining geology. From the year 1868 to the present time I have been United States commissioner for this district—the region of territory west of the Rocky mountains—and am now still nominally in that capacity, although I have ceased for a year to make any ex-
311 plorations or act in that capacity. I am now managing mines in the east—six mines—and am engaged in practice as a metallurgist and engineer, in connection with private undertakings there.

Q. What mines have you examined during your practice as a mining engineer?

A. I have examined a very large number of mines in all portions of the United States and Canada, and some in other countries, but more particularly gold and silver mines west of the Missouri river.

Q. In what states and territories?

A. In all the states and territories west of the Missouri river, with the exception, I believe, of Arizona.

Q. Give an idea of the number of mines you have examined, and your familiarity with the mines.

A. I could not tell you. It may be five hundred, or it may be a thousand. I never kept any account of them. I have made reports, outside of my government reports, on a great many mines that I have examined.

Q. Can you state some of the mineral districts in which you have previously examined mines in the states and territories west of the Missouri river?

A. In all the mining districts nearly; in all the chief mining districts in Gilpin, Clear Creek Lake, and other counties in Colorado; in Cottonwood district, Bingham Canon, and other districts of Utah; in Reese river, Silver Peak, San Antonio, Belmont, White Pine, Pioche, Eureka, and other districts of Nevada; and along the mother lode in various counties of California, at Grass valley, Nevada city and neighborhood, and other districts at Canon creek, Auburn, the neighborhood of Baker city, and other districts in Oregon;

at Owyhee and other districts in Idaho; in Union district
312 and the neighborhood of Helena, Virginia, and other districts in Montana.

Q. Have you ever examined the Jackson, K. K., Eureka, and Richmond mines on Ruby Hill, near Eureka, in the State of Nevada?

A. I was there in 1872, I think, and examined the principal workings on Ruby Hill, with the exception of the Richmond works, to which I was refused access. I was there again in the present year twice.

Q. Can you describe the characteristics of these mines, and state your opinion whether they are upon one and the same lode, or upon separate lodes?

A. If you will permit me to make that statement somewhat at length you will avoid the trouble of questioning me and perhaps save time. I found, in examining upon these different occasions, more particularly upon the two latter ones, the following state of things in regard to the mining works and mineral deposits of Ruby Hill and neighbordood. In the first place I found the quartzite that has been referred to in this place repeatedly occupying a peculiar position; and particularly I noted that this quartzite in Ruby Hill was elevated along a different axis—the axis in a different direction—from that which seemed to be the general upheaval of the quartzite in that region as it is the general line of upheaval through Nevada in the ranges which I observed; that general line approximating northerly and southerly, giving rise in an approximate way to that general strike of the mountain ranges, whereas, this is a more easterly and westerly upheaval, and consequently, gave rise to what is called a spur of the mountains. Ruby Hill, therefore, appears to be a spur in a north and south range,
and the quartzite runs along Ruby Hill in a general easterly
313 and westerly direction. I found, however, that subordinate to this general easterly and westerly direction, there were indications of what I considered a curve in the ledge, so that near this point of Ruby Hill it crops out or is upheaved along a line somewhat curving in its direction, running a little more north in the Richmond, a little more due east and west in the Eureka, then somewhat more easterly in the K. K., and then taking this bend very sharply through the Phœnix and Jackson, in the latter of which mines it runs off south. To continue the description of the quartzite first, and finish that: I found that in depth in the mines, and particularly in the Eureka, the quartzite would bulge, or buckle as I term it, which I believe to be the result of this peculiar line of fracture and upheaval, since a curving of the quartzite in that direction, showing a period when an upheaval was also going on upon the general line, would tend to crush it together on a line from east to west, and in upheaving it along the line it would become perfectly straight. It would follow, as a matter of course, that the

quartzite could not raise without disturbance in its general dip and strike, because on the side of such a basin of upheaval the lower levels would not have the same room as the upper ones, consequently if the quartzite were originally a solid and continuous mass, and were upheaved in that way, the only way in which the lower levels could occupy and be contained within the spaces thus left for them would be to crush or bend in shape, as may be shown easily by a sheet of paper. [Describes it with a sheet of legal cap.] This is corroborated by the fact that the particular and principal bulge of which I speak in the Eureka mine, which is shown very clearly on 9th level on the map, where it is dotted as bulge in the foot wall, and has been pene-
314 trated by the 9th level through quartzite, is also visible in other levels of that mine and continued decreasing in size, indicating at once the cause of that difference in the strike. There are indications, which I did not consider closely, of some similar bulges in the other point, where the quartzite seemed to occur in the Richmond. The simple fact of a change of direction in the upheaval would also indicate that the quartzite and overlying strata were there subjected to special pressure, more than would generally be the case. The effect of this course of this quartzite seems to have been chiefly to have changed locally each of those bulges. Overlying the quartzite I found dolmite limestone, which contains more or less magnesia; I have forgotten the exact relations. This limestone I found to be everywhere crushed, fissured, brecciated, and in every way disturbed, showing proofs of minute moving in the whole texture of the mass. The crushing, fissuring, and brecciating, I think, are clearly the result of pressure and the pressure of this quartzite, which has not only exerted upon the limestone the upward force of the upheaval, but also the far more locally effective force of this buckling, which intruded masses of the quartzite into the overhanging limestone and made it necessary for the limestone to shift, break, and actually move within itself. So that I found proof not only of the crushing which might have resulted from a simple pressure in one direction, but also of the dislocation of the limestone; dislocation which evidently in some cases extended on cleavages of fissure planes at right angles to the quartzite, and in other cases was horizontal, and which in still other cases indicated an actual
315 movement of large masses of the limestone under the pressure exerted by these bulges of quartzite sideways and upwards in the body of the limestone itself. Farther north, along the line of Ruby Hill, I found at several points on the surface and at many points in depth a layer or vein of clay. I concluded, after all my examination was done, that this was not a fissure traversed with rocks, but that it was a layer of clay occupying nearly the original position of a layer of clay-shale or fragments of shale and limestone. This layer of clay dipped near the outcrop and for some two or three hundred feet below much more steeply than the quartzite; the quartz-

ite dips being generally 45 deg. and the dips of this layer being in many points 60 to 80 degs. That was the only reason why I at first was inclined to think this layer was a fissure coming up to the limestone, because it seemed strange that a layer should dip so much steeper than the parallel layer of quartzite. But on examining the features of the crushed and dislocated limestone again, I came to the conclusion that this widening of the belt of limestone between the quartzite and the clay on the surface and near the surface, as compared to its greater depth, was due to the actual intrusion of masses of limestone, shoved and crowded up from below by the pressure of the quartzite in which the limestone moves, the mass moving upon itself. The width of this zone between the quartzite and the shale, I think, on the surface, measured across the outcrop or summit of the hill, was something like 800 feet. I presume a straight or horizontal line between would be over 400 feet, whereas the depth at the various points is 250 feet and so on down to 200 feet.

That would be the 9th level of the Eureka. Intruded in the
316 limestone, between this quartzite and this clay, or overlying this clay and beyond it to the north and northeast, I found magnesian limestone again, differing from the magnesian limestone between the quartzite and the clay in the following respects: First, that I frequently found in it distinct stratification. Even where it was crushed it was so crushed that the stratification was obliterated. My experience has been that it is very difficult to crush a rock so as to obliterate the stratification by simple pressure, and that rocks frequently, though entirely crushed, will still exhibit a stratified structure; but when rocks have been both crushed and moved and dislocated so that the particles broken up do not any longer retain their original position and juxtaposition, and when the interstices between have been infiltrated by other matters, though by a slow process, extending even to the remotest parts of the rock, the stratification may be obliterated. Another distinction between the limestone north and south of this clay seam is the fact that south of it and between it and the quartzite bodies of ore have been found and impregnations, bunches, threads, clefts, cross-fissures, and all known forms of ore deposits, minutely copied, have been discovered; whereas, so far as I could observe in any of the explorations made near this zone, so far as I could discover by any inquiries made, and so far as I know by any general knowledge of the district since the year it was first opened, there never has been in the neighborhood of this zone any body of ore discovered outside of that clay seam. The ore, as worked in these mines, is essentially the oxide of iron, carrying carbonates, arseniates, and chlorides of lead with gold and silver in forms not determined to my knowledge. These
317 ores of lead and iron appear and are argentiferous and auriferous. Wherever the oxide of iron contains enough lead, gold, and silver to be profitably worked, it is extracted as ore. Where this is not the case it is left in the mine. In conducting my

examination, however, after having observed at a sufficient number of points this characteristic occurrence of minerals together, I everywhere followed the indications of the oxide of iron, which was the greater bulk of all the mineral deposit, without reference to the question of whether it would assay in gold, silver, or lead or not. I consider, in such a case, the bare inquiry into the nature of the deposit is what is required; that the mere question of whether the ore will or will not pay, in such a time, is a purely economical question, and entirely independent of the geological questions involved. In addition to the fissures produced by the two causes which I have mentioned, namely, by general crushing and by the movement in most of these limestone seams, there are still mineral caves where the works have fallen in. I speak now of the natural caves in the limestone. These caverns are of all sizes, from the size of a man's fist to a hundred and more feet in diameter and height, and they are also very irregular in shape, and the walls indicate, in many instances, what we should call a stalactite character; that is, the walls show water coming down from the top, and stalactites and various minerals existing or pendant in icicle forms. There is also a general form or position of these caves which seems to connect them in a certain way with the foot wall or quartzite of the lode, a matter which I will explain in a moment. There is a general succession of them, so that they seem to follow down stepwise, in roads or
318 lines, in this zone of limestone. The ore is found sometimes in large bodies, which frequently occur in and under these natural cavities, sometimes in thin seams or threads, following along in all directions, through fissures and the rocks, and cementing breccia or fragments of the rocks. Almost invariably it is found in that band along the quartzite, of more or less thickness, in some cases expanding to large bodies, lying on the quartzite, and in other cases constituting merely a thin seam, which I have never seen totally absent, though it has sometimes been no thicker than my hand, along the quartzite wall. From all these indications I had no difficulty in deciding upon the general class of ore deposits to which this vein on Ruby Hill belongs.

It belongs to a class of ore deposits which has never been accurately defined or agreed upon by writers on mineral veins, although there is a universal agreement that it is distinctive and peculiar, and separate from all other classes to which they have given names. It is the class which is called by Cotta, simple lead and zinc deposit in magnesian limestone, because he could not give it any other defining or distinguishing name. The difficulty of defining it arises from the fact that it partakes of the nature of all the classes of ore deposits except that of sedimentary deposits, deposited in regular order like coal veins. All the classes of what are called the secondary ore deposits are represented in these magnesian limestone deposits; consequently, though there are a great many of these deposits in the world, and they do at present, and always have, produced the bulk

of the lead of the world, there has never been a uniform agreement among authors as to the class, among other deposits, to which they should be referred. For this reason, in some cases these de-
319 posits occur in such connection with true fissure-veins, coming out of the foot wall and running along the country rock or foot wall, and merely being near the new deposit of limestone and not continuing beyond it, yet in these cases the deposit has been called a true fissure-vein. In other cases deposits have been found which ran on the stratification of the limestone in the belt and did not follow the fissures or stay inside of the fissures, in which case they could not answer the description of true fissure-veins, even though true fissure-veins ran through them. The definition of true fissure-veins is not satisfied when the fissure is in the ore; consequently, the ore extending outside the fissure and connecting with outside limestone, the authorities would not consent to call that a true fissure-vein, but rather an impregnation fed by fissures.

In many cases it is running off through the limestone, and there it is called beds. After various modifications which Von Cotta has made in the definition contained in his book, as the last edition shows, he has come to the conclusion that these deposits may be all put in different classes. The most recent authorities, summing up all that has been written on the subject, and giving the result of the latest surveys of the most extensive mines of this character in Europe, have pronounced the ore-bodies and the zone of rock containing the ore-bodies to be the ore deposits, and fissures crossing those beds to be subordinate features of the ore deposits, even when ore deposits, or the zone of limestone containing them, had but one distinctive wall and the fissures went through it. This is the opinion and verdict given by the official mining geologist of Austria, the country in which the largest part of these deposits occurs. The report
320 was published by the Austrian government in 1873, I think, and goes into the matter thoroughly, with maps and a complete description.

I simply mention it here, not attempting to give it in full, to show the line of reading by which I am led to my views in regard to this deposit. I found, then, that with regard to such deposits that they are called by one or another name, according to their shape; that there was no question raised as to their general similarity and origin in nature. If the one was found in the shape of a vein it was called a vein; if it was found in the shape of a bed it was called a bed; if it was found in the shape of a large chamber it was called a mine; if found impregnating the whole mass it was called an impregnation; if found in contact along the vein it was called a contact-vein or contact-body, according as the writer chose. Proceeding, then, to make further comparisons of this ore-body on Ruby Hill with those of other countries, I find it differs with them in two or three particulars which are significant. In the first place, it is wholly of oxidized and carbonated ores, whereas a large part and nearly all of

the magnesian deposits—lead deposits in magnesian limestone—contain galena and zincblende, which are sulphuret ores. The Ruby Hill deposits contain zincblende and galena and sulphate of iron and arsenite of iron, but only in subordinate forms or bodies at present. There is one body which I have observed in this zone which consists, as I judge from inspection, of arsenical pyrites with some galena and some zincblende.

There are also bodies, nodules, and masses of galena found occasionally in the mines, imbedded in these masses of ore. But
321 the great principle in the mines is oxide. That is the first distinction between it and the other mines of dolomite. The second difference is, that, whereas in most cases these mines have but one distinct contact or wall to bound their general channel, there is in this case a second one. There is no quartzite underlying the limestone or clay seam overlying the limestone zone; and between those the whole of the ore deposit is enclosed. That is a distinct feature, the definition which I think separates this from the ordinary ledge deposits in magnesian limestone. It is true that the lead deposits of the Mississippi Valley, which are magnesian limestone, are bounded both above and below by limits, but they are horizontal deposits. These two features of the oxidized form of the deposit and of the two walls tend to make this case clearer, in my judgment, than the cases in which the limestone is simply impregnated in an irregular way or by connection with a single wall. I have been accustomed, as a mining engineer, to attach very little importance to those cases or classification of deposits which simply involve the referring of the deposit back to verbal definition in the books. The whole subject of the classification of mineral deposits is one in which the interests of the miner have entirely overridden the reasonings of the chemists and of geologists. The miners made the definition first. As used by miners before being defined by any authority, it simply meant that formation by which the miner could be led or guided. It is an alteration of the word lead; and whatever the miner could follow, expecting to find ore, was his lode. Some formations within which he could find ore and out of which
he could not expect to find ore, was his lode. The term
322 lode star, guiding star, or north star, is of the same origin. The Germans have a similar word with a similar meaning. When the definitions were first admitted, they were admitted by a class of geologists attached to the Mining School of Freiburg.

They define a vein to be a fissure in the earth's crust, filled with mineral. But even in the writings of that school they are unable to avoid the general usage of miners, who will call anything a vein that has the shape of a vein, and has all the practical significance of a vein; and the one vein in which he finds ore, and outside of which he does not find it. So, even in Von Cotta's book, where deposits which he clearly describes as not a vein, are called veins. I find 20 or 30 instances in Whitney's book, in which, after very clearly stating

that such deposits are not veins, and makes use of the term for convenience sake.

But even this definition of a vein as a fissure filled with mineral, is not one that can be sharply maintained. The one definition that can be sharply maintained is indicated, I think, very clearly by Whitney, in his work on the metallic wealth of the United States, and by other authors, which refers to the position of the ore, and of the vein when the vein is a wholly intercalated member or series of stratified rocks. When it is stratified deposit in this order in the rocks, then it is distinctly and clearly separated from the body or accumulation of ore which has come into its position later than the rocks surrounding it. That definition is a sharp one, but it is easy to see that in a case in which the mineral mass consists half of the substance, that is where it has always been since it was deposited as rock, and the other half of the substance, which has come in since,
323 or one part of the original rock in its original place or position, and the other part of infiltration, impregnating that which has come in since; even this definition fails to cover the classification of deposit.

Moreover, the whole question of a fissure is one which is not very easy to carry out in definition, for besides those fissures, which may be supposed to have opened and staid opened in their full width until suddenly filled with mineral matter, there are all grades of channels in the rock which are classified as fissures. For instance, after a fissure has been opened for a certain length of time, pieces of rock settles and forms horses. Those are older than the rocks above them, but younger than the rocks below them; and what we call the fissure is that which is left after those go in. Even if there was a great many of them, nevertheless a fissure is what is left. There are a great many other phenomena in which a large part of the fissure is made up of the material of the country; and one author, in his classification, has made a separate class of those between the 4th and 5th subdivision, in which the vein matter does not come up from below, but was rubbed off the ground, off the two walls of the veins themselves. This will go on, and, according to his classification, it does go on in various points. In the case of a fissure, which was simply a parting in the rocks, as a great many fissures undoubtedly were—that is, they never kept open to make large channels and let water in, and the fissure has been dislocated and broken. In regard to such fissures as that, it is applicable; and it is conceded by Whitney and others that a fissure may be entirely filled though mostly filled from side to side with fragments of clay on the walls. In that case, I would say what was left was a fissure;
the interstices show a fissure. And this deposit might be,
324 by force of logic, even classed as a modification of the fissure, unless there undoubtedly was a fissure between the quartzite foot wall and the limestone overhanging it, in the geological sense. I prefer, however, in my consideration of this deposi-

tion, not to attempt to force into such a connection with the form or definition of the word; although the idea of a fissure-vein goes from one end to another of a series of deposits which may terminate in a formation like this; but the essential matter in all such formations like these is; and the ore comes in its present condition after the enclosing of the rocks were deposited, that is, after what we consider the first wall and hanging wall were deposited, has this same difference of opinion with regard to these deposits of magnesian limestone in their present form. They are later than the enclosing of the rocks; the formation is later than the enclosing of the rocks, as we find it; there is a difference of opinion as to whether the lead ores contained in these deposits have point, because it tends to show that the ore in this zone of limestone was more generally diffused than it is now, that the ore which is now in caves must have been at, or about that level, in the limestone where those caves were formed, and afterwards must have been scattered; that there were, however, such masses and lodes of ores in the limestone is presumably the case. There are remnants of that still, but I do not pretend to say what position they occupied in, or whether they were altogether distinct from the present bodies wherever a remnant of galena is found encased and surrounded by oxides and carbonate ores. I have very little doubt that that galena is in its original location in the zone, and that this zone or surrounding body of oxide ores and metallic ores. Hence I believe the oxidation was produced by percolation of water from above; and, finally, I believe a redistribution of ore and a reconcentration of it was produced by the same agency, because I believe that the process of oxigenation could not go on without such a process of redistribution, because a portion of the solution so formed was more or less soluble and might go on with the waters until they either by meeting some other solution or change in pressure or temperature or rate of descent, they precipitated the metallic substance contained. The consequence of this observation and conclusion, althought it is not, in my judgment, as essential to the classification of this deposit, it has strengthened my opinion in regard to the foot wall. I have seen the ore lie nearly horizontal. I have also found in the top of caverns where ore-bodies have been opened and not altogether extracted, irregular cavities filled with gravel from above washed down on top of it.

My further reason for believing that these ore deposits were caused by filtrations downward is that waters coming up from the center would not oxidize. Subterranean or dipthermal generally carry free oxygen. They could not deposit both carbonates and sulphates, and they could not, in my judgment, oxidize deposits of sulphates. But surface ores which contain both free carbonic acid and free oxygen from the atmosphere do have this oxidizing effect, and this universal phenomena that they exist if on all sorts of sulphates turn to one wall more than another, though the steam and

gasses would be gradually hugging the hanging wall, though in this deposition there is the clear relation of the ore-body to the foot wall of such a character that it seems to me to be deposited by waters which deposited these precipitates reaching the foot wall, and the percolating
upon it, but went no farther. I find on the foot wall in
326 some places a gradual stratification of the ore where the foot wall bulges that makes it farther in dip and these ore-bodies occur. I have overheard, without asking questions on the subject, many miners and foremen say, and have been so answered when I inquired, that they were the presence of caverns, and a flat dip of the foot wall is the best indication for the finding of ore on this flat.

A. In other words, that no two periods or processes of formation I allude to, namely, the upheaval and crushing forming a fissure and matrix, and the infiltration, or ascension from below of metallic matters, a third must be added, that is, percolation of surface-water, which in my judgment has shaped, if not altogether formed, the caverns in the limestone, and has concentrated the ore in its present distribution so that we no longer have it in precise position and form in which it was once distributed in this zone. My reasons for saying that are briefly these: First, the shape of the caverns in their present position. The ore-bodies there seem to me tending the quartzite foot wall; the water trying to find its way, but stopping when there. I don't know why water ascending from beneath shrinks through, and it occupies the channel in the lode subject to the action of infiltration or sublimation, which action would naturally be found in the channel in those two boundaries. That will lead one step further, but the ores are chiefly a characteristic exudation, that is, the second characteristic of the deposit, namely, that the ores are exudations, and the peculiar method of their distribution, particularly in the caves, led me, however, to a still further conclusion as to the history of the formation, accepting the general doctrine that these ores were deposited by ascending solutions and
have, nevertheless, been led to the conclusion that in their
327 present form the bodies or deposits of ore within this zone of limestone are the result of water percolating downward from above, and not upwards from beneath, separated out of the limestone, or have come down from above into the limestone, or up from below. Upon these subjects different writers are still differing; but I hold that the general view, and reasonable view, is that in all, most all, these cases, unless there is some specific expression to the contrary, the original infiltration with sublimation is from below, and that the ores that ascended in this upheaval of rock. In the present instance, however, we are brought, as I said before, to fix these two distinguishing marks on the outside; first, the fact that this zone of rock is bounded; and when I say bounded, I do not mean merely that there is simply different kinds of rock above and below it; that there is different rocks and formations above

and below it—by clay and quartzite, which do not let water, particularly the result of the oxidation of the original nucleus of galena, and particularly the result of a subsequent deposition of oxidized ores from other parts of the zone, which have filtered around that nucleus. I was confirmed in this idea of the formation of these bodies, by the downward filtration, by the peculiar occurrence in the K. K. mine, of a body of quartz. I found no quartz anywhere else within these two boundaries which I have described, and very little silica. The limestone in the zone, so far as I could tell by my examination of it, or so far as I have heard from an analysis of it, any more than the amount of silica on the ore, dolomites of the paleozoic age not so commonly carry. I am using as a flux in my furnace a common dolomite limestone, which
328 contains eight per cent. of silica, which is a larger amount than any analysis of this lode shows. The absence of silica in a vein would not be remarkable except for that body of quartz. When I examined that body of quartz and saw its position, which is based under the gulch which comes down at the right-hand end of that map and crosses the country at the end of the K. K. location, I saw that the gulch came down from mapes of quartzite on Prospect mountain and other regions, beyond which there were also ruptured rocks of various kinds. So I knew that the conditions of the various silicious solutions were not impossible where the canyon had been ended in the quartzite, which would make it not impossible for the silica to be dissolved and brought down with all the waters of that canyon. I found that all the waters of that canyon, had been, from an unknown zone, passing along that gully, crossing the porous and fissured outcroppings of the fissured limestone lode, and it seems to me that the occurrence right in that canyon of a body of quartz should be ascribed to that circumstance. There being no other point, according to the present topography of the surface, where the surface would, crossing the quartzite, could get into that vein, the quartzite being everywhere else under the vein.

[The court here adjourned until the following morning at half-past ten.]

329 FOURTH DAY.

July 26, 1877—Morning Session.

Testimony of R. W. Raymond—examination-in-chief, continued.

Mr. Thornton.—Please proceed with your testimony.

The Witness.—In addition to the characteristics which I observed upon Ruby Hill, and described yesterday in my evidence, I found that in three places in this zone, between the quartzite and the clay, the ore extended from the quartzite continuously to the clay. The *first* of these places, which I call one place, although it is observed

at two points some 30 feet apart, is in the Jackson mine, where both the quartzite and the clay have been exposed and followed for more or less distance, until at last, at one point, they are 10 or 12 feet apart, and the whole of this space of 10 or 12 feet consists of ore, lying upon the quartzite on one side and contiguous to the clay upon the other side. At another point, about 30 feet under this, developed by the winze and drift, the quartzite and the clay are nearly in contact, there being a space of less than an inch between them, and in this space apparently no limestone whatever. This space being entirely filled from one wall to the other with a seam of ore.

Another point where I observed the ore extending from the quartzite to the clay was in the K. K. mine, I think in the 3d level; where I followed it from the overhanging clay, through a crooked series of cross-cuts, all of the way in ore to the quartzite.

The third place where I found ore extending from the
330 quartzite to the clay was in the Richmond mine, where the Potts chamber lies nearly or quite upon the clay and contiguous to the clay in the hanging wall, and is traced through workings of the Richmond mine to the foot wall of quartzite. Following this tracing, I was obliged to assume that open spaces filled with square timbering to a considerable extent, were, as I am informed, the remains of bodies of ore which had been excavated. But I considered those open spaces as a part of the tracing.

In view of all the circumstances observed by me upon this formation, and considered characteristic, in my judgment, of the formation, I should have concluded it to be practically a unit, or a single ore deposit; whether ore could be traced longitudinally from one body opened upon it to another, and so from each body to all of the others, or not.

The difficulty about such tracing in a zone of great depth underground, is that no miners' work which we can undertake will expose the whole section of the zone in its wider part. In ordinary, narrow, simple fissure-veins, where a drift will show nearly or completely at one time both the hanging wall and foot wall, and in its roof and floor the whole width and structure of the vein, it is quite easy to trace consecutively the contents of any given level. But where the mining drift cannot possibly give anything more than a perforation of the body of the vein, cannot show both walls at once, and cannot exhibit in its cross-section the whole cross-section of the deposit, it is, of course, difficult to trace from one deposit or opening or chamber of one to the other, even though there be a connection. I may illustrate this by referring to the case of what
are commonly geodes of amethysts, or quartz, spherical
331 stones, which, being broken, show upon the inside the traces of successive infiltrations or crystallization of silicious matter, agates, amethysts, druzes, etc. Although it is well known to geologists that in all such cases the silicious waters have penetrated into the interior of the geodes from without, and although in a

great many cases, by skillful sections of these geodes, workers in stone have been able to show exactly upon the section the place and manner of the infiltration. Yet, on the other hand, in by far the larger number of sections made of all such, there is no such exhibit of the place where the fluid entered. And I have known very intelligent geologists to be at fault on an expansion of such a geode, simply because, without access to books, and relying entirely on their own experience; and after breaking a great many of these stones, they never were able to find where the solution got in.

In the same manner we may make a great many sections by mining works in a vein of large winze, without being able to trace the actual connection between one and the other. This is the case upon the Comstock, with regard to several bodies, concerning which I have been frequently informed by good theoretical and practical authorities, that they have had no reasonable doubts of some connection between the bodies, though it had never been exposed in the workings. I, therefore, do not, personally, attach so much importance to the longitudinal tracing of ore from one body to another, as many practical experts do, because I have known it to be absent from the causes I have mentioned in cases where I had, nevertheless, no doubt of the practical connection of the bodies. Nevertheless, in this case there is a clear tracing of ore upon the foot
352 wall from the body of ore now being worked in the Eureka mine, in the 5th level, within the Margaret claim upon this map, down through winzes to the 7th level of the Eureka mine, and to the 8th and 9th levels of the Eureka mine from the old ore-chambers on the 9th level; and by a drift winze of the prolongation of the drift from the Richmond, marked here at the point "6 E, 35 feet above the 6th level." So, from this drift in the workings of the Richmond mine to the Potts chamber, and thus connected with the mine workings in that chamber, it is at this point "6 E," to the point "6 F," "6 G," and "6 H," and particularly the point "6 G," through their irregular lines of workings, that I have traced the ore continuously across this zone to the clay. There is, therefore a tracing of ore—a distinct and uninterrupted connection from the body in the Margaret down along the foot wall of the body of the 9th level of the Eureka, and so along the foot wall into these workings of the Richmond, from which point it is continuous from the foot wall to the clay. This tracing was comparatively easy to make, because it followed, for the greater part of the distance, the under wall. It was only necessary to keep upon that wall in order to find a vein of ore which, in the majority of instances that I have observed, accompanies that wall, though sometimes it is different.

With regard to the limestone outside of this zone which I have described, and north of it, and constituting, according to this description, the hanging wall country, there is at various points on the surface the indication of further shale structure—clay shale, argillicon or calcareous shale; and I think that all of the way across the

limestone, so far as I examined. In riding or walking over
333 the country to the north, there are at intervals such be ls.
And the reason why I have come to the conclusion that the clay found along the northern boundary of this zone is a continuous and almost identical body or deposit, is, because it is the first clay that I can find, or first trace of clay that I can find in going from the quartzite across from the north. If we prove that this clay is not perfectly continuous at any point; if the drift should at any time hereafter be driven to the northeast from some part of this zone, and carry us clear out into clearly stratified limestone, without encountering clay, it would not militate, in my judgment, against the theory that I have formed, any more than small irregularities of that kind are allowed to overthrow the general evidence of the character of mineral deposits. Neither would it be, in my judgment, fatal to this conception of the nature of this deposit, if occasionally a body of ore should be found outside of this clay shale in the limestone.

I have no personal knowledge that any such thing has ever occurred. The universal verdict of everybody with whom I have spoken upon this subject, since the earliest days of the discovery of the Eureka, has been that in that region they had found nothing. But it was not in the earliest days that we knew anything about this boundary of clay. Therefore it is only since the present year that I have directed my inquiries to that particular point. I have seen many persons who have examined that, and have examined myself such exposures as lay under ground; and I have come to the conclusion that that was practically barren; and that a little body of ore in it would not change my views upon the subject.

There is another point with regard to this limestone out-
234 side of the zone on the north, namely: near the surface, where it is exposed in the Utah and the Bell tunnel, it is often irregular, although I find the appearances of what I suppose to be traces of stratification at such points; and it constitutes for some feet from the surface on the outside of the hill a mass which I recognize practically as, and what the miners would call cemented float, fragments of limestone which have covered this hill, and which may have rolled down, and certainly have rolled down from the crest of the hill from the inside of this zone, and have in many cases been deposited and gradually been re-cemented on the surface of the hill. So there is also a cap before you can get to a settled condition of the rock. In this cap we find very plain indications of boulders, of what I suppose to be the limestone of the crest. I therefore would not accept as characteristic of this limestone any sections of it made in, or any specimens of it taken at the surface or very near the surface. Those specimens taken from the outside and inside might show distinct differences, but I have no doubt that specimens can be selected outside that I could not distinguish by the eye, and which very careful examination might

not distinguish from pieces of limestone taken in this zone. In depth the limestone out of this zone does, to my judgment, show a distinct, clearly marked, and general difference.

This is a mere matter of judgment which I base upon the grounds I have given, and which will remain a matter of judgment. I make the declaration as the result of practice in looking at rocks on the ground after recognizing the general description of the rock which it might be difficult to define. It is as a consequence of the
symptoms and characteristics I have described, taken to-
335 gether and carefully weighed, that, in my judgment, this de-
posit is to be considered as a single vein in that sense of the word vein in which it is used by miners, that is as a single ore deposit of identical origin, age, and character throughout.

I think this is all that I care to say, except to sum up in this statement. I believe the deposit to belong to the class of deposits which have been by all writers at last separated from typical fissure-veins; differing from typical bodies; differing from typical segregations, and from typical impregnations. Because this class is found to contain instances, and single instances are found to contain indications of all those processes and variety of deposit, because it has been found practically absurd to discuss or define a deposit of such a character in one place as a lode, and in another place as a body, and in another place impregnation, and in another place segregation, all in the same mine, which was the logical result of the attempt having been previously made to establish this specific class. The class of ore that is deposited in magnesian limestone there, is necessarily irregular, because, in addition to the crushing and fracturing, the matrix or mold of the deposit has been shaped by this act of dissolving. And, therefore, it is to be classed according to its general characteristics in form and position, as a bed or vein; or if too irregular to be classed as a bed or vein, then it must be considered as a stock-work or a mass. But the best authorities have ceased to attempt to make out all three things in one place, as they would be obliged to do if they followed the exact definition, claim for smaller and similar occurences. Recognizing the fact that this gives a great deal deal of latitude for individual judgment, and taking that re-
sponsibility, not on the authority of others, but on my own
336 authority, and on the authority of experience and observa-
tion, I say that this deposit is most likely a vein like all of the magnesian deposits of which I have read or seen, because differing from most of them in fact that it is with remarkable sharpness bounded by two walls, as the general shape of the vein. I have stated my theories of this formation at some length, because that theory strengthens this view in so far as it goes to show that the process of formation itself rendered the whole zone a unit as it was a mineralized zone by one process. And even the present segregation of ore in that zone are a secondary or tertiary action posterior to its mineralization; which, therefore, gave us segregated ore-

bodies in many cases in this mass; which bodies, previous to their exudation and deposit in these present forms, may have been and probably were very generally distributed throughout the limestone zone. If, however, this theory should not be correct, it does not touch the main ground of my judgment. My judgment is based upon all of the facts that I have related; but the ground of it is upon the fact that this is a magnesian limestone deposit of ore in the mineralizing of the zone; and that the zone is well defined, and has the shape of a vein.

Q. You have spoken in your testimony about certain authorities upon the subject of these veins, and have given descriptions, definitions and descriptions. Will you produce those authorities to the court?

A. I have here the first volumn of Von Cotta's "Vein Studies." This edition was published at Freiburg, in 1850; and the original edition in 1847. It was a sort of periodical, appearing in numbers. The first part contained the famous treatise and posthumous fragment of Von Isenbaum, which has been quoted by author-
337 ities since. On the third page I find the following passage:

"The term vein or gangue has its origin in mining. The ore goes or takes its gangue through the rock; just as the miner also refers most of the other terms of the ordinary characteristics of veins to the exhibition of a sort of living being. At all events, veins are tabular fossil masses, each substantially distinguishing themselves from the rock in which they are intercalated. Since, however, this property also belongs to beds and seams, and since the condition set up by Mr. Werner, that veins must cut through the strata of the rocks, is not comprehensive, because certain veins lie parallel to the strata, and many others occur in rocks which show us stratification. Hence, in order to distinguish veins from beds and series, it is necessary to add the words, 'with indications of a secondary formation.'"

On the 12th page of this essay, in the classification of veins, which Von Isenberg sets up, is the passage:

"The second class is called veins of attrition," defined as follows:

"Veins which consist of products of friction or other mechanical 'disturbance of the country rock."

The word "disturbance" may also be called here destruction.

On the the 19th page, I also find here "these veins of attrition 'are considered in detail, and divided into several sub-groups ac-'cording to whether these products of mechanical destruction or 'action between the country rocks are by deposition of the country 'rocks, or by attrition, rubbing fine and productive sand or clay, or 'by squeezing; and finally the still coarser variety where the veins 'are filled with fragments of the country rock, and finally where 'they are filled with boulders of the country rock."

338 On page 24, under the head of "veins filled with products of crushing," Von Isenberg says: "Moreover, this kind of

'products of crushing from the disintegrated country rock, occurs 'not seldom upon the surfaces of stratification, or bedding in of 'stratified or shale rocks in a perfectly similar manner, as in veins. 'Thus, for instance, the so-called flying veins or flyers in the gneiss 'at Anaberg which even followed the veins of ore, and hence must 'have suffered movement since the formation of the latter."

On the 22d page, under the head of "Veins," supplied with fragments of the country rock. After describing the manner in which these fragments may be formed, he says: "This form might be a 'complete filling of the fissured space, with added fragments and 'slices of the country rock. If, afterward, there occurred a differ-'ent chemical process belonging to some of the other classes of 'veins, then these fragments and slices of the country rock were, by 'incrustation, or cementation, fastened again together and enclosed, 'and the whole mass would appear as a fragmental rock, or some-'times good rock, or as one vein, many fissures and sub-veins of 'which enclose these fragments and slices of the country rock."

It is not necessary to support my statements, but it is necessary, to be perfectly fair in this quotation, to say that when Mr. Von Isenberg, who died before this treatise was published, and left it unfinished, or left a separate class of ore-veins outside of all of these veins in his classification, and had never treated that class. Therefore, Professor Cotta, in publishing this paper, publishes an appendix to it, in which he says, after stating that nobody can understand why a separate class of ore-veins should be made, un-
339 less for mere convenience, because the other classification had already included all of the possible ways of making the vein. On page 78 he says:

"It seems most likely to me that he meant to assume for many ore-veins, and particularly for the veins of Freiburg, a combined method of origin, according to which one and the same vein, would belong to several of these five classes."

In order to shorten my production of authorities, I attempted to arrange my quotations under these principal heads to which they refer; but I find that the shortest way is to take up each book and just refer to the passages as rapidly as I can. The three points were, first, the nature of the definition of a lode in its practical application. Second, the intrusion of an ordinary kind of deposit into another. Then, to show that the usage of authorities themselves is to call an ore deposit a vein, in the sense of the miners' definition, and to prove that by instances from authorities. The third point I wish to show is what the authorities say about this particular class of bodies, how they have come to an agreemeent to put it into a separate class by itself.

Mr. Von Cotta's definition of a vein is given on page 26: "Veins are accretions of mineral matter in fissures of rocks. Lodes are also accretions of mineral matters containing ore in fissures."

In Professor Prune's translation here, the word "vein" in the

first of these sentences was given for the original German word gangue. And the word lode, in the second, is given for the German word meaning "ore-vein." That is the distinction which the translator of this book has made; but it is not found in any other works, and is of no special value. The vein may be ore-vein; and,
340 therefore, to say that veins are accretions of mineral matter in fissures of rocks, and then to make these distinctions between veins and lodes, through a praiseworthy attempt, is an attempt which has hitherto not been accepted. There is a slight difference, otherwise, between the translation and the original, which is of no importance, however.

The Court.—The act of Congress speaks of veins, lodes, and ledges, and that is also in the patents. The act of 1872 speaks of a vein, a lode, and a ledge. The term "ledge" being entirely unknown in literature until recently, when it has been adopted by miners in these cases.

Mr. Thornton.—The language of the act is, in one place, "Vein or lode of rock in place."

The Witness.—I next refer to page 155.

[Mr. Wilson moves that the witness, instead of reading from the several books, give simply the title of the book and the page referred to, which may afterwards be used in the argument.]

The Court.—I suppose the whole book might be considered in evidence. The witness accompanies the citations with some observations, and I think this as expeditious a way as we can take. Proceed.

The Witness.—My object in making these quotations at present on this branch, is not to give any idea at all as to the theory of these authorities about a vein, but simply to claim that having the theory with which I started in, and having given the definition they do, they use the term vein by simple necessity as in ordinary use, to mean things that do not strictly come within their definition of a vein.

The Court.—They do use the term in the sense in which miners use it, distinct from the sense in which they use it?

341 A. I think that I can show that they do, and that it does not affect their theory; that they use the term after having explained that it is not a vein, knowing no one will misunderstand the phrase.

On page 155, in the description of the groups of veins in Clausthal, in the Hartz, in Prussia, speaking of one of these groups, he says:

"The whole group consists substantially of ore-lode whose depth 'varies from one to fourteen fathoms; its matrix is predominantly 'so-called vein clay slate," etc.

On page 157, under general remarks on all of the groups of this district, Mr. Von Cotta says:

"The fissures, often many fathoms broad (60 to 150 feet), are 'for the most part filled with fragments of the wall rock, especially 'clay slate,' just as we might speak on Ruby Hill of vein limestone and country limestone. "Perhaps it would be more correct to say 'that many single fissures have cut through the rock in zones; 'that those zones have been disturbed and now appear as a kind of 'fissure matrix; that the fissured slate has at the same time been 'altered in some degree by water or vapors, and is contradistin-'guished as so-called vein clay slate from the common clay slate."

I also refer to page 178, under the description of "Celebrated iron lodes at Steel mountain, at Seiger, Germany." Mr. Von Cotta says: "This deposit is another vein or bed. It appears to me to be a broad or irregular vein." He speaks of it as having two branches, and a clay slate filling between."

On page 179, Mr. Von Cotta speaks of a vein of conglomerate twenty-four fathoms broad, and says: "Within this vein of
342 conglomerate there occurs a lode of hematite." The word in the German original is exactly the same in both cases, both "conglomerate" and "hematite."

On page 182 the passage marked is a description of the lead and zinc deposits in Westphalia, in limestone, which are described as occurring in pockets.

On page 185 the lead deposits in limestone in Belgium are described. [Reads.]

On page 252 is a description of the galena deposits in the limestone of Upper Silesia, in Poland, and a diagram is given of such a deposit, which is called "bed," because it occupies a horizontal position, and would be called, in my judgment, vein-like, or a vein. Von Cotta declares that it is not a true bed, but it is an impregnation, and that is because the ore it contains has come into it since the bed was deposited. I also refer to page 254.

On page 269 is a description of the deposits of argentiferous galena, in Transylvania.

On pages 332, 333, and 334 the deposits of galena ores in the Austrian provinces are referred to as the most important ones in this connection. I also refer to page 338.

From this extended discussion it is evident that his classification of the ores of Freiberg, as procured in two fissures, refers to subordinate features of those deposits; that there are fissures coming out of the country rock and going in to the foot rock, and sometimes containing ore; that that is what he meant; while the main mass of deposits were not of that character. This is also the view of other and later writers.

On page 431 the pipe-veins are defined in this discussion; and it is stated that the only true veins in the pockets of the Cum-
343 berland are pipe-veins, which depend upon the stratification of the rock; and they are not found in the cross-fissures. At the end of the book Professor Von Cotta had edited and written

with his own hand a theoretical retrospect, in which he makes a reclassification of deposits. Finding that the classification with which he started is not sufficiently applicable in practice to all cases, he says, on page 479:

"Simple as the division into beds, lodes, and impregnations may appear at sight, there is still reasons to doubt," etc., and there is a long passage to the same effect. He makes three groups. And in the second group, which he gives here, contains nine classes of ore deposits; one of which, separate from the rest, is a lead in zinc deposit in limestone and dolomite.

On page 497 he says: The same ores occur in the fissures of stratification as flat veins and in irregular spaces as pipe-veins."

I have read this to show the usage of writers as to the word "vein;" and, second, the transition of ore form to another, etc.; and, third, the description of this group of deposits. Some of these quotations apply to one of the three points, and some to another.

I have here the latest address on the general subject of ore deposits, and the deposits of useful minerals by Gohan Green, (?) director of the Imperial Royal Mining Committee at Tribran, of 1869. I refer first to page 15, where it is stated that the various kinds of ore deposits are simple repetitions on a large scale of the various kinds of accretions or small patches of ore in ordinary rock.

On page 231, in summing up the whole subject, he has a chapter devoted to the transitions and connections of the different deposits of useful metals, showing how they pass from one to the
344 other, particularly declaring that "all characteristic deposits 'or kinds of deposits occur inside of one another as minor 'beds."

I refer, also, to the books of Henry de la Bache, the American edition, published in Philapelphia in 1851. On page 644 the subject of pipe-veins is discussed, and they are declared to be no fissure-veins.

I have also a book by Professor Maurice Gaetzschmann, of Freiburg, on "The Discovery and Exploration of the Deposits of Useful Minerals." I will read two lines of it from page 70, on his definition of veins: "Veins are tabular ore deposits; fissure-spaces 'filled, or at least comparable to such, which ordinarily differ, and 'by a stratification or otherwise, distinguish themselves by their 'characteristics, as formations of later origin than the rock in which 'they are contained."

I quote this because Professor Ketchman, (?) having risen from the position of practical miner, knew that there were many veins which could not be clearly recognized as actually fillings of fissures. And, therefore, he says, "or at least comparable to such." At the same time he and Professor Cotta, on all occasions, endeavor to make a distinction between the true and simple vein, and these

vein-like bodies which are practical veins of the mines, they being simply filled fissures.

I have here a book called "The Metallic Wealth of the United States," by Professor Whitney, of Philadelphia, published in 1854. And I will refer to a few paragraphs. On page 40 the author says: "In 'the phenomena of *contact deposits*, segregated veins, and *true veins*, 'there is a gradual passage from one class of forms to the other, so 'that it is not always easy to say to which of the divisions a deposit 'of ore may belong."

345 On page 187 it is stated that "when the mercurial ores occur in the older metamorphic rocks, they appear to exist either in true veins or in connection with them; but the great masses of ore belong rather to the class of contact deposits."

I quote this because it is in accordance with my own belief and observation with regard to quicksilver ores in this country, and because the law used the term "vein or lode" of quartz or rock carrying, among other things, silver, and, therefore, I supposed that the ordinary meaning of the word "vein" would include a deposit containing cinnabar, and all the quicksilver veins on this coast, as it practically does in the locating of claims and the issuing of patents. On page 189, the deposits of the Almaden mine are described as contact deposits; and, on page 190, after having described that as a deposit, and not a vein, one of them is spoken of as "the main vein." On page 273, in the description of the copper mines of Lake Superior, the author says: "At several other mines along the southern edge 'of the greenstone, this layer of cupriferous rock, commonly known 'as the 'Waterbury vein,' has been intersected by pushing levels to 'the north. But I know of no instance in which any considerable 'amount of copper has been met with."

On page 302, Professor Whitney, after clearly explaining the sedimentary nature of the deposits to which he refers, nevertheless, without any quotation marks, speaks of a Portage vein which runs parallel with the Isle Royal vein at a distance of 200 feet west of it; and says they are in every respect similar to each other. Then, although he has explained that there are no veins.

346 On page 303 is also his account of the Quincy Mining Company, in which he uses the term vein. It is equally a vein, but is also described as not a vein.

On page 312, the copper deposits of the Atlantic States are mentioned, and they are declared never to be found occurring in well-developed transfer or fissure-veins; and there again, on page 322, he describes one of these deposits as a metalliferous bed, and says: "There are two great metalliferous beds parallel with each other 'and with the strike of slates." Also, "At the time I visited this 'district, a year ago, the western vein only had been opened to any 'extent; on the eastern on explorations had been commencing at 'many points."

Then, on page 323, he says: "The thickness of the veins, from

'the decomposition of whose ores this black mass has originated, is 'in some places enormous."

On page 324 he says: "There has been hardly any attempt, as yet, to develop the veins below the lines of the black ore." He has also described them as "beds," but they are called veins by the miners. And thus, having explained sufficiently his technical distinction, he pays no further attention to it, but calls it a vein. On page 347 the same thing occurs where the Shawangunk mine is described as not a true vein, or scarcely a true vein. The author says: "According to Professor Mather, this deposit of ore occurs in a bed parallel with the strata of the Shawangunk mountain, about two miles northeast of Wurtsboro. He considers it a true vein, which, from his own description of it, can hardly be. It forms a segregated mass, varying from two to five feet in thickness, and the larger portion of which is made up of a silicious rock like that forming the roof and floor, and containing particles of green-
347 ish and blackish slate. The metalliferous contents of the vein are blende, galena, copper pyrites, and iron pyrites, which are associated with crystallized quartz, the two former minerals largely predominating; the leader of solid ore varies from a mere seam to three feet in thickness."

On page 361, pipe-veins are discussed, and shown to be not true veins.

On page 365, in the description of the metalliferous district of Cardiganshire and Montgomeryshire, it is stated that the gangue of the lodes consists mostly of fragments of slate, connected together by quartz and little calcareous spar.

On page 370, is simply a confirmation of the statement that I have made of copper.

"The mass of the vein-stone is made up of a breccia of the country held together by calc, spar, brown spar, spathic iron, quartz, and heavy spar."

On pages 373 and 374, the deposits of the mines Bleiberg and Raibl in Carinthia are spoken of as not seeming to have much resemblance to true veins. In the next sentence but one, in saying that this galena occurs in deposits, etc., he says: "The ore is raised 'from the mines by means of cars on a tramroad laid down in an in-'cline shaft of large dimensions, which dips with the lode at an an-'gle of 52 degrees." I think that deposit has not much resemblance to a true vein.

On page 377 is another description of the silver mines in Spain, which, he says, "do not seem to be the nature of true veins." In the next sentence he speaks of a vein.

On page 378 he says: "The returns of the mine show a gradual impoverishing in silver, as the work descended in the veins."

348 On page 395 he says: "Professor Beck, in speaking of the Anerim mine of New York, has declared it to be a lode without the characteristics of a true vein."

On page 414 it is stated that no true lead veins occur in the Mississippi valley.

On page 412 another reason is given for the fact that the fissures there are destitute of gangue. I will not read it.

On page 432 it is said that iron deposits which are not true veins are called veins in Norway and Sweden.

I have a few more books.

The Court.—Q. To the same point?

A. There is nothing important to the point, except to confirm my statement as to usage. I now wish to refer to the testimony taken by the committee of the House of Representatives of the 44th Congress, the first section of the report of the Emma mine investigation, where a number of practical miners were examined as to what was the miners' usage concerning a lode.

Mr. Wren.—We object to that.

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The Witness.—As he has not written any work on the subject of this Ruby Hill deposit, the only thing that I could get from him was his testimony on the subject.

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349 error to receive it in this case. I doubt whether you could take the testimony of any one giving the description of any particular mine, and use it as evidence.

The Witness.—I have here also, as the chemical branch of this subject, a number of authorities; but I do not like to take the time of the court by reading them.

The Court.—I don't think it is neccessary to go into that.

The Witness.—I have here a book entirely devoted to this subject. It is a treatise on the lead and zinc deposits of Corinthia, by Poshepney; published in Vienna in 1873. Mr. Poshepney, with whom I am personally acquainted, is an official mineral geologist, connected with the geological survey of the Empire of Austria; and his sole business is to examine geological conditions with reference to mining; and, therefore, the geology of mineral deposits. He has done this for a number of years, and published a series of reports, which are issued by the Royal Empire Geological Institute of Austria; and who is in charge of the progressive geological survey of that whole empire. It is in German; and I will only call your attention to a single phrase.

Before I make any statement I would like to explain the diagram connected with the report, in order to call your attention to the similarity between this occurrence and the occurrence of Ruby Hill. The first diagram indicates the manner in which the ore has penetrated the fissures; and the author calls it typhons of dolomite [the witness describes diagram to the court]. I wish to call attention here to the fact that in these cross-sections of the two principal deposits there are four colors in each cross-section. These colors refer to the different clefts on which the mineral works have been run. I will read from pages 358, 360, and 394 [reads].

250

Cross-examination of R. W. RAYMOND:

Mr. Wren.—Q. What is a lode?

A. A lode is a fissure in the earth's crust, filled with mineral matter.

Q. What is a true fissure-vein?

A. The same.

Q. Is there any other definition?

A. I have no other definition.

Q. Is there no other definition given in the books?

A. I don't remember any other, except some explanations of that.

Q. What is a fissure-vein?

A. A fissure in the earth's crust filled with mineral matter.

Q. What is an impregnation?

A. An occurrence of ore mineral in the interstices and pores of and other mineral matter which it has entered subsequent to the original deposition or hardening of the first and second mineral matter.

Q. What is the theory usually accepted in reference to the difference in the formation of impregnations and lodes?

A. I believe there is no difference in the formation, except in the shape of the recepticle into which the mineral matter is received. Lodes and impregnations may be both found in a great variety of ways.

Q. What is a stope, or stope-work?

A. Such a body of ore mingled with country rock, or barren rock, that miners have to take the entire body out together, and do it in floors; hence it is call stope-work, or story-work.

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Q. Isn't this about the definition of stope-work: A zone of rock fissured in every direction, containing small veins crossing each other in every direction, and filled with valuable mineral matter, that can only be worked by taking out the entire body of rock containing these cross-veins and fissures?

A. No, sir; that is not the true definition, because a stope-work is not a zone, or need not be a zone.

Q. What is a zone of rock?

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A. No, sir; that is not the true definition, because a stope-work is not a zone, or need not be a zone.

Q. What is a zone of rock?

A. It is a mass of rock of indefinite body, predominating length and breadth, and minor thickness.

Q. What do you mean by breadth?

A. The same dimension which would be depth if the zone rock stood on end; if it is horizontal it is breadth.

Q. Make your explanation now in regard to your answer in reference to the stope-work.

A. I have made it.

Q. Have stope-works definite limits?

A. Sometimes they have and sometimes they have not. The tin stope-works of Saxony have definite limits. Their stope-works fade out gradually by impregnation into the country rock.

Q. What is a segregated deposit of ore?

A. Generally it is a deposit of ore which is supposed to have accumulated from the rocks adjacent.

Q. Is that Mr. Von Cotta's definition of a segregated ore deposit?

A. I don't remember; I think it is, substantially.

Q. What is a bed?

A. A bed is a rock formation, deposited either from melted or fluid form, or from water, and constituting a member of the
352 general series of over and underlying formations; so that it is older than the formation above it, and later in origin than the formation below it, where the strata are undisturbed.

Q. What is a bedded vein?

A. I don't know.

Q. Don't you know that Mr. Von Cotta describes bedded veins?

A. No, sir; he does not. I will say that he describes bed-veins; but he does not call them bedded. If they are bedded they are not veins. But the term "bed-veins" indicates something that is a vein, that has the position of a vein. I consider the phrase bedded vein to be a mistranslation.

Q. It is found in his work, isn't it?

A. It is found in Mr. Prime's translation. I have told Mr. Prime it is not correct.

Q. How does Mr. Prime describe a bedded vein in his translation?

A. I don't recollect the description in words; I think I can give it substantially. It is a vein which conforms more or less closely in dip and strike with the enclosing rocks.

Q. How are bedded veins and bed-veins distinguished?

A. There is no distinction. Bedded veins do not exist.

Q. How does Mr. Prime distinguish them in his translation?

A. He doesn't distinguish them, because he simply uses the wrong term, and does not use the right one at all.

Q. What is a true vein?

A. It is a seam, as I have described; a lode and fissure-vein; a fissure in the earth's crust and filled with universal matter.

353 Q. What is a contact-vein?

A. It is a vein along the contact plane of two rock masses.

Q. What is a cuticular vein?

A. A vein of a cuticular shape.

Q. To what point were you reading all of these authorities?

A. Three points. First, to show that the miner's general popular usage with regard to the term vein, particularly in the absence of any other word in our language to represent a whole ore deposit, which was clear and definite in its meaning, has been too strong in literature, as it has been in common practice, for a scientific definition; and that even when authors have given it a careful scientific definition they frequently use the term in its wider and general significance; and that their usage in works causes no misconception as to its meaning. The second point that I read these was to show that, by the common conviction of others on this subject, all of the distinctions that have been attempted to be set up by means of definitions are simply approximate and must be taken with great allowance. My third point was to support my statement that magnesian light ores are considered to be a separate class.

Q. After your careful study of all these works on the subject, what is your best opinion as to the proper classification of the limestone on the hill known as Ruby Hill?

A. I think that the limestone zone crossing Ruby Hill between the quartzite and clay belongs to a class of mineral deposits which I have just referred to, the lead ores in magnesian limestone; that all of the deposits of that class may be named veins, beds, or mere

354 chambers, according to their form or position; and that the form, positions, limits, and contents of this deposit justify me in naming it a contact-vein, consisting in part of the remains of a pre-existing sedimentary bed which formerly occupied nearly the same position, and in part of matter which has penetrated since; but, as a whole, after all of the redistribution and chemical and mechanical action which the zone has undergone, the formation as a whole later in origin than either of the rocks enclosing it.

Q. You have been United States Commissioner of Mining Statistics?

A. Yes, sir.

Q. You have made several reports?

A. Eight.

Q. Did you ever, in any of these reports, after examining these mines, state positively that it was not a contact-vein?

A. I don't think so.

Q. See if you recognize this language?—"Ruby Hill is a spur of 'the Diamond range. Its general trend is northwest to south-southeast. 'The old openings of the Eureka Consolidated, as well as those of 'the Richmond and Tip-Top, are on the western, the new ones on the 'eastern slope. The strike of the ore-body is nearly east and west, 'and its dip about 45 degrees to the northeast. For this reason ore

'was first discovered on the western slope of the hill, where the 'vein crops out. The main or Lawton tunnel, the mouth of which 'is towards the town (on eastern slope of hill), is now in over 600 feet, 'and passes 120 feet to the north of the Keyes shaft, between it and the 'Windsail shaft. At its end it is in ore. The first ore was met
355 'with about 300 feet from the mouth of the tunnel in the 'K. K. claim. The shafts mentioned above are connected 'by galleries, and from the main tunnel runs a short side tunnel 'into the Sentinel grounds. The main object of the tunnel is, there- 'fore, to transport through it all the ores from the works connected 'with the two shafts named, and from the Sentinel claim. From 'the mouth of the tunnel the ore is to be transported by means of a 'narrow-gauge railroad, which is to run along the Jackson grade to 'the smelting works. On the back trip the trains are to bring water 'and supplies to the mines, where the erection of powerful hoisting 'works is contemplated as soon as stopes are opened below the level 'of the tunnel.

"The Keyes shaft is now 175 feet deep, and serves as the main 'hoisting shaft for the old works. These are to the largest extent 'in a broken quartzite which crops out below the Nugget and Sav- 'age, on the western slope of the hill, and, to judge from its dip, 'can only be reached at greater depth on the eastern slope. The 'so-called cap-rock of the ore-bed is limestone. The ore-body itself, 'though it exhibits a certain regularity, is neither a cross-vein nor 'a contact-vein, and I cannot give it any better name than that, or 'ore-bed or zone. Horses of a broken limestone, with every strat- 'ification, are frequently met with; also cavities with splendid druses 'of nulfenite (molybdate of lead), calcspar, aragonite, quartz, and, 'lately, malachite and agurite. The approach to the vein matter is 'first distinguished by a yellow color of the first dense, afterwards 'broken limestone, next by a stronger impregnation of pulverulent 'brown and yellow iron-ore and stopes of the first."

Do you remember that?

A. No, sir.

356 Q. Do you want to look at the book?

A. Yes, sir. [Witness examines book.]

Q. Do you recognize it now?

A. I recognize it as a part of my report of that year. It was made in 1871. At the time that was published I had never seen this locality, and I did not write those pages. The pages themselves show that my information was derived from correspondents in the locality. I consequently took this account of it, as I have frequently done, and as I am obliged to do, as I cannot possibly visit every year every district of the United States; and I incorporated it into my report.

Q. When did you first visit the Eureka Mining District?

A. I think nearly two years after that report was written.

Q. Who wrote that report for you?

A. I have no recollection; but I think it probably was Mr. Hahn; and the only thing I did to it was to take his account and rewrite it. I had never seen the mine. If you have the report that I published after seeing the mine, I can show you what I said then on my own authority.

Q. What year was that in?

A. The report was probably printed in 1873. There is a little irregularity about the dates of publication, and they sometimes delay them a year.

Q. You made that report from what some other person wrote?

A. Yes, sir; and the larger part of all my volumes are made in the same way.

Q. This report was published in 1872; but I suppose it was written before that?

357 A. The date inside will show you that it was rendered in 1871, and it must have been written largely in 1870.

Q. Do you recollect whether Mr. Keyes wrote that report for you or not?

A. Yes, sir; I can recollect that he did not.

Q. Was he in the habit of writing reports for you?

A. He has several times made contributions to my books, but in every such case you will find his name mentioned in connection with the part that he wrote.

Q. It is rather a singular coincidence that we find Mr. Keyes' report to the Eureka Mining Company immediately preceding this. I suppose that year you got Mr. Keyes to write one report and Mr. Hahn another?

A. On the contrary, I had Mr. Keyes' report to his own company, and I put that in; and then I got Mr. Hahn to write a report for me, and I put that in.

Q. You class these deposits with deposits found elsewhere in magnesian limestone. Why should deposits of magnesian limestone differ from deposits of any other kind of limestone?

A. Because there is magnesia in magnesian limestone; and that has a different effect upon infiltrated solutions.

Q. What is the difference?

A. There is a difference of solubility between the carbonate of lime and the carbonate of magnesia. The amount of magnesian deposit is more unequally soluble than lime deposit.

Q. What is the deposit of Ruby Hill?

A. Magnesian limestone.

Q. What is magnesian limestone?

A. Limestone containing magnesia.

Q. What is dolomite?

358 A. Dolomite is a magnesian limestone containing a certain percentage of magnesia.

Q. Is there any limestone containing magnesia classed as magnesia limestone, except dolomite?

A. Yes, sir.

Q. By what authors?

A. By all authors. True typical dolomite represents a certain percentage of the carbonate of lime mixed with a certain percentage of the carbonate of magnesia. From that all the way down to pure limestone without magnesia, there is every grade of dolomite or magnesia limestone, sometimes called magnesian or dolomitic limestone, indicating that it is not combined in the exact proportion of the dolomite.

Q. What percentage of magnesia is it necessary for the limestone to contain to be classed as magnesian limestone?

A. I have forgotten. I think it is 46 per cent.

Q. I am talking of magnesian limestone now. What kind of magnesia is it that is necessary to make limestone magnesian limestone of a pure quality?

A. There is no limit.

Q. If there is one per cent. of magnesia present in limestone, it is magnesian limestone?

A. I think not

Q. How would it be if there was five per cent.?

A. I shouldn't call it magnesian limestone then, at that.

Q. Ten per cent.?

A. I should call it magnesian limestone at ten per cent.

Q. At what limit between five per cent. and ten per cent. would you put the dividing line between magnesian limestone and limestone not magnesian?

359 A. I don't know.

Q. Somewhere between five and ten per cent. is necessary to make the magnesian limestone?

A. No, sir; I don't think there is any such limit.

Q. I understood you to say just now that if it did not contain more than five per cent. that you would not consider it magnesian limestone?

A. I said that I shouldn't. I don't think I should call it magnesian limestone, containing only five per cent. I should simply say it was limestone containing so much magnesia. That is a question of pure geology, and I have not examined it.

Q. does the limestone of Ruby Hill contain five per cent. of magnesia?

A. I don't know from actual analysis of my own. I think it does.

Q. You think it does?

A. Yes, sir.

Q. Do you think the limestone of this zone contains any more than that?

A. I think that the limestone out of which this zone has been formed contains more than that. But I think that the processes which have taken place in that zone have tended in many instances

to give it more carbonate of lime and less magnesia, in places. I don't believe that the analysis throughout the zone would agree; therefore, I cannot answer your question.

Q. From what process would the magnesia be removed and the carbonate of lime added in its place, chemically?

A. The carbonate of magnesia is less soluble than carbonate of lime. The percolating waters, therefore, would carry in solution more carbonate of lime. After the mechanical crushing of
360 the mass, and its being filled up with fissures, a part of the mass having been removed, not chemically, but mechanically, by jamming up, we should have in a given space a mass of crushed and broken rock, instead of solid rock. That would be less in weight, therefore, than the solid rock, and interstices would then have to be filled with percolating waters. Those waters would bring in, in such a formation, the carbonate of lime. We would then have, instead of the original mass of dolomite, a part of that mass occupying a part of that space, and the rest of the space, filling the interstices, pure carbonate of lime, so that the whole mass would contain more carbonate of lime and less magnesia.

Q. From what source would the carbonate of lime be derived?

A. From the rock itself, in the upper levels.

Q. Then the rock in the upper levels would show more magnesia and less carbonate of lime, and below, more carbonate of lime and less magnesia?

A. There should be found in such a zone deposits of magnesian sand and the remains of just such an action. That is, the rock above should be more magnesian. But the rest of the rock above, which does not remain in the form of magnesian sand, has swept away.

Q. Answer the question directly; yes or no, if you please. If the process which you have described has operated on Ruby Hill, you would find less carbonate of lime near the surface, and in the body of the limestone more carbonate of lime below, wouldn't you, and more magnesia near the surface, and less magnesia in proportion to the lime below?

A. No. You ask me if I would find it. I would not;
361 because the upper levels which have been deprived of their carbonate of lime are entirely swept away, and are gone down into the debris of the country around; therefore, I would not be able to find what had been above.

Q. About how much of the upper strata has been swept away?

A. I have no idea.

Q How much do you think?

A. I have never made an estimate.

Q. Can't you make one now?

A. I cannot.

Q. Don't you think that originally Ruby Hill was probably 500 or 600 or 1,000 feet higher than it is now?

A. I have never formed any opinion. I simply see the appearance of great erosion there.

[Recess until 2 o'clock P. M.]

362 FOURTH DAY—CONTINUED.

THURSDAY AFTERNOON, *July* 26th.

Cross-examination of R. W. RAYMOND—Continued.

Mr. Wren.—Q. At the close of the examination this morning you said that Ruby Hill had probably been very much higher than it is approximated. But you were unable to approximate its probable height prior to its erosion. Is that what I understood you?

A. Yes, sir.

Q. Would not the surface waters flowing into the limestone from above constantly dissolve out the carbonate of lime and carry it to lower levels as erosion went on?

The Witness.—Will you be kind enough to repeat that again?

Mr. Wren.—Q. Would not the surface waters flowing into the limestone, or the body of limestone lying between the quartz and shale, dissolve out the carbonate of lime and carry it to lower levels constantly as erosion went on, that is, from year to year the height of the hill would be reduced a trifle? Now, would not the same influence that acted to reduce the height of the hill also be apt to dissolve out the carbonate of lime near the surface and carry it to the lower depths in the hill?

A. Yes, sir; to a certain extent, moved by two causes: the first of which would be the alteration of the limestone, so that it would not be so liable to further alterations in subsequent periods. In the second place, it would be a possible change in the nature of
363 the waters themselves. The surface of the waters become charged from the vegetable matter lying on the surface with carbon or carbonic acid to a greater or lesser extent.

Q. And from the air?

A. Not that I am aware of. From the air, did you say?

Mr. Wren.—Yes, sir.

A. From the air, yes; but not from vegetable matters. But as the constitution of the air has not been constant, it might have more or less carbonic acid.

Q. You think that the carbonate of lime would be dissolved out and carried below in the way I have indicated, but to a moved extent, owing to the influences you indicate?

A. I do. And I think, moreover, as I said before, the whole distribution of this phenomenon in this zone would be entirely irregular, depending on the fissuring and such local conditions that no illustration of any sections or special sections of the ledge or zone would represent fairly. There may be a patch of more magnesium

and a patch of less magnesium, owing to the circumstances, not the rock.

Q. In other words, you would think there was no other way of ascertaining whether that was original dolomite or not? You cannot ascertain it by analysis? You cannot ascertain it by inspection? And the whole matter is left to conjecture?

A. No, sir; I do not think so.

Q. Well, how do you think it could be ascertained?

A. Well, I think that since the limestone overhanging this zone is nearly a typical pure dolomite, and since these rocks were, in my opinion, originally deposited as sedimentary formations in
364 succession, I am justified in supposing and inferring from that that the limestone of this zone was originally more nearly a dolomite than at present.

Q. How do you determine that the rock is dolomite or not dolomite without analysis?

A. I did not determine without analysis.

Q. Have you made an analysis?

A. I have not.

Q. How do you know it is dolomite?

A. I have been told so—that is, I was not told so.

Mr. Wren.—Oh! you were told so.

Witness.—Excuse me. I have not been told so, but I have been shown analyses of the rock.

Q. Who showed them to you?

A. I think I have seen analyses of the rock in various publications, and also particularly they were shown me last April in this city by Mr. Luckhardt. I think I saw them in the report of the Richmond Company; also, I wish to say that I have never said that any of the limestone is dolomite. I never meant to say it was pure dolomite. I say the limestone outside the vein produces pure dolomite according to this analysis, and all the limestone is dolomitic; this is more or less magnesian. You cannot tell by inspection whether the exact percentage which constitutes the mineral species "dolomite" is or is not present; but you can tell by inspection how nearly—that is, you can tell whether the limestone is highly magnesium or whether less so. Can you tell with reference to the limestone on that hill from the limestone found at a depth, by inspection?

Q. Do you mean inside the zone or out of it? Inside or outside?

A. I mean inside there; but I can't decide by a single specimen.

365 Q. Have you ever been in the Ruby Hill tunnel?

A. No, sir

Q. Do you know where the Ruby Hill tunnel is?

A. No, sir.

Q. Were you ever in the tunnel that runs into the hill, in a south-

westerly direction from near the railroad cut, about a quarter of a mile east of the Richmond hoisting works?

A. I can't tell. I can tell the only tunnels I have ever been in.

Q. What are they?

A. The only tunnels I have ever been in are the Bell-shaft tunnel, the Utah tunnel, the Lizette tunnel, the Lawton tunnel, and the Jackson tunnel; and I don't think I have been in any others; I do not now recollect any others.

Q. Where have you been in any deep underground workings to the northeast of the shale?

[After examining.] You have never been in any deep underground workings to the northeast of the shale, have you?

A. Yes, several places; I am trying to find them on the map. [Examining.] I have been in the deep underground workings to the northeast of the shale on the Richmond seventh level from the point "7 F" to the point "7 J."

Mr. Thornton.—Q. Point it out.

Witness.—A. From here to here [pointing to map].

Mr. Wren.—Q. Is that northeast of the shale?

A. I so consider it.

Q. Don't that run through the shale all the way; that level? It does not cross the shale at all, does it?

A. Well, I have not spoken of the shale; I have spoken of clay in my testimony, and I supposed you meant the same thing.

366 Q. I asked you of the shale; I want to know where you have been in the deep underground workings to the northeast of the shale on the Richmond seventh level?

A. If I have spoken of shale I shall have to ask you what you mean by shale.

Q. That is precisely what I have spoken of.

A. Then what do you mean by shale?

Q. I mean shale; you found shale in the Richmond here, did you not?

A. I found clay and I found shaly limestone and stratified limestone.

Q. Didn't you find shale in the Richmond 7th level from "7 F" to "7 J?"

A. I am only anxious to find out in what sense you use the term. My idea of shale is simply a stratification finer than ordinary bedding, yet not so fine as slate. Now, I find shaly limestone from that down.

Q. Did you not find the purest kind of shale in that level, with not a particle of limestone in it, or with lime in it?

A. No, sir; I will not say not a particle, but scarcely any lime in it. I don't know how much lime there is in it, and I don't know what the purest kind of shale is.

Q. I suppose the purest shale would be clay alone.

A. Shale is a term of structure alone, and the term purity cannot be applied to it.

Q. We will not dipute it, then. What do you call what you found from "7 F" to "7 J?"

A. I wish to say I have no desire to split hairs about it. I think you asked me where I had been beyond the clay wall.

Q. I asked you where you had been to the northeast of the
367 shale in the zone. I don't know that it is a term very difficult to understand. That body of rock has been treated as shale by the witnesses that have testified in this case, and I think you fully understand it. You heard them?

A. I beg your pardon, I did not hear them; I paid no attention.

Q. Is that what you term shale or not? You say shale does not depend upon the composition of the rock, but upon the structure?

A. Yes, sir.

Q. Has the rock in that drift, between the points I have designated, a shale structure, or not?

A. It carries a structure passing from shale to stratified. I should call it all, practically, shale. The term shale is not a very definite term as to structure.

Q. At what point did you find any stratified rock in that level, from "7 F" to "7 J?"

A. I can't tell you the exceptions. I think I noticed it in several places.

Q. Have you been in deep underground workings to the northeast of the shale at any point?

A. I have been to the northeast of the clay seam in another branch of the Richmond 7th level, if that is what you mean. I have examined both the Richmond 8th and the Richmond 7th levels, and I have passed this seam in the 7th and this seam in the 8th. I have been out in the 7th to the end of it, and to the end of the 8th—if that answers your question.

Q. Did you not state in your affidavit that that stratified limestone found along it to a point between "7 g" and "8 e" was inside of the shale and inside of the vein? You made affidavits, did you not?

A. I made three affidavits. Yes, sir. Now, do you wish to know if I stated that in any of them?

368 Q. I do.

A. I think I did in one of them.

Q. But all of these affidavits were made before you had examined the whole of these openings, some of which have been made since?

A. I will state to you exactly what have been made since, and then you can see, at least, what I saw that time and what I see this time. [Examining notes.] In April, I examined the 200, 500, 600, 700, and 800 feet levels of the Richmond tunnel and the old Richmond incline. In July, I examined the 600, 700, and 800 again, and a part of the 7th level from the seam running out to "7

H," to the heavy clay at 7-4 on Westcoat's map. I used Westcoat's map. I don't know as the points are the same. [Pointing.] From "7 L" to that clay [pointing] was new to me, and I believe it was made since my former visit.

Q. 7 what?

A. "7 L."

Mr. Thornton.—Q. That is on the 8th level?

Mr. Wren.—A. No, sir; it is on the 7th.

Witness.—This is exactly what my notes are: "Down Richmond 7th to hanging-wall seam, and beyond to heavy clay, at 7-4 Westcoat's map. This appeared new." That is the way I have it in my notes. That is the guide to my recollection.

Q. Do you recollect of a cut that is run off from the 7th level between the points "7 H" and "7 G," finding stratified limestone on your former visit to the Eureka, and before you made your affidavits?

A. "7 A" to "7 G?" Yes, sir.

Q. Do you know or not that in the affidavits you stated that the stratified that you found in that cross-cut was inside of the vein?

A. Yes, sir.

369 Q. Then that could not have been new?

A. Why could it not?

Q. Because you saw it at that time. What do you mean by the term "new?" Don't you mean by that that these developments were made before you visited these works the last time?

A. Yes; that is what I mean.

Q. As a matter of fact, if you saw it and if your affidavit referred to it as having been seen on that former visit, you were mistaken about its being new?

A. No, sir; because I am not talking now to you about that [pointing]. I did not speak of from "7 H" to "7 g." I referred before to this [pointing], from "7 g" to "8 E," and that is particularly heavy clay along here, as marked on Westcoat's map, from here to here [pointing], that I had not seen.

Q. Do you say that from "7 g" to "8 E," you had not seen or examined?

A. That is what I stated; of course that is what I would state.

Mr. Wren.—Q. Well, we differ about what you stated. What do you say about it now? Is the limestone that you find in the cross-cut from the 7th level of the Richmond, running to the southwesterly, between "7 H" and "7 G," in the lode or not?

Witness.—A. Well, do you mean northwesterly or northeasterly? [Pointing.] That is northeasterly.

Q. Yes. That cross-cut is running off to the northeast. Will you please to trace the cross-cut that is run?

A. That is it right there. Don't you see?

Q. That small cross-cut in there?

A. Yes; that is a small cross-cut.

Q. I don't remember that cross-cut. All the cross-cut it is is much longer than is laid down on that map.

370 A. I have no recollection of it, but I remember distinctly my impression of that was that limestone is stratified in that wall, and I presume I got it from that cross-cut.

Q. Do you recollect that you stated in your affidavit that that stratified limestone is inside the vein.

A. I don't remember whether I did or not, but I presume I thought it was.

Q. Do you not recollect that you stated it had fallen down into that vein, and been turned around?

A. No, sir; not that way. I did not say so. I said something else.

Q. If it was your opinion that that stratified limestone lying to the northeast of the 7th level of the Richmond Company was in the vein when you testified before, how is it that you now say it is outside of the vein? Or, in other words, if you now say that the fissure that is exposed along the 7th level, between "7 H" and "7 G," is the hanging wall of the vein?

A. I have understood that it was the hanging wall of the vein that I remember.

Q. Did you not point it out a little while ago as the line of the shale?

A. I said there was the line of the clay along there; I considered the hanging wall of the vein at that point as split, and that there are two veins of clay; the one enclosing a mass of stratified limestone; but I don't regard it of any importance whether that body is inside the vein or not.

Q. You think the presence of stratified limestone inside or outside of veins, then, has no bearing whatever on the question of vein or no vein?

A. Where a mere local occurrence, none whatever.

Q. The stratification or limestone that you saw outside of

371 what you call the vein near the railroad cut is a mere local occurrence. How is that? The stratified limestone that you see lying northeast of the ravine that runs down to the northwest past the Richmond Company's claims is only a local occurrence, is it not?

A. I don't consider it as such.

Q. You don't know now what is the extent of it?

A. I judge it is a local exposure of a general occurrence.

Q. How do you know that it is a local exposure of a general occurrence?

A. Because I have traced all the boundaries of it, including the southern and western boundaries, except the northern boundary.

Q. You have not got the northeast boundary, have you?

A. I have it here, if you will allow me; I have the traces of the

line of this seam here to the striking of this lode here, all the points of which I have examined, and they indicate to me that the line goes through there; therefore I have it indicated; the indications at "8 E" and "7 F" point towards each other.

Q. This is not bounded to the northeast. You don't know where the northeastern boundary is, do you?

A. No; I don't know where the northeastern boundary is. I was erroneous in my use of the cardinal points.

Q. I was not asking you for inferences, but for facts.

A. My whole statement on the subject is a mere inference. My whole statement as to this shale is a mere inference from facts observed.

Q. As a matter of fact, intercalated bodies of shale is a very common occurrence in veins of limestone?

A. I think they are.

372 Q. And thinning out in every direction; thinning out upward, downward, and longitudinally? That is very common?

A. Yes, sir.

Q. And similar occurrences of bodies of limestone in shale are very common, are they not?

A. Of shale and limestone?

Q. Of limestone in shale?

A. No, sir; they are not.

Q. The bodies of limestone found in shale are always continuous, are they?

A. I don't say that. I said occurrences of limestone in shale are not so common as shale and limestone.

Q. Oh, not so common. But they are common?

A. You said similarly common. I thought you meant equally common.

Q. You are a little critical about terms.

A. Well, I thought you were trying to get me to contradict myself.

Q. Not at all. While we are on the subject of shale, you say that you found shale or clay in the Bell-shaft tunnel, near its mouth?

A. Yes, sir.

Q. How much shale or clay is exposed there?

A. I don't remember. I am afraid I have not got it noted.

Q. There is not more than four or five feet, is there?

A. I could not tell you.

Q. Does it extend all the way across the tunnel?

A. I don't think it does. All the way across the tunnel crosswise?

Q. Yes, sir.

A. Yes, sir.

Q. Does it extend the full height of the tunnel?

373 A. It does.

Q. The tunnel is about five or six feet high?

A. Yes, sir.

Q. Then that is an entire exposure of the shale?

A. The entire area is exposed in its thickness.

Q. Then you find the shale again at the Utah tunnel at the point about 50 or 60 feet from the point at which you find it in the Bell-shaft tunnel?

A. Yes, sir.

Q. The Utah tunnel or incline is not laid down here?

A. No, sir.

Q. You find a few feet ore exposed there?

A. I see what you want to inquire. I have the notes exactly to give you. The Bell shaft has 6 feet by 6 feet of shale exposed, making 36 square feet of the area which is not exposed, because it has been cut through. I assume that because I traced the edges. In the Utah it is 6 by 6, making in the total 72 square feet. Now, if you desire to save time, I will give you a list of all those exposures.

Q. I will get along faster by taking my own course. You can find the shale exposed going to the southeast in the K. K. 3d level for the first time, do you not?

A. In the K. K. 2d level.

Q. How far is it from these exposures of this clay seam to where you find it again in the K. K?

A. I find it in the K. K. 2d level 6 by 8; I find it in the K. K. 3d level 8 by 35; I find it in the K. K. 3d level, at another place, 30 by 6; I find it in the K. K. 3d level 90 by 6, and in the K. K. 7th level 66 by 6.

374 Q. I was asking you the distance between the points at which you find it in the Utah incline and tunnel, the nearest point to the K. K., and the point where you find it in the second level of the K. K., the nearest point to the Utah tunnel.

A. I don't think that is the nearest point.

Q. Where is the nearest point at which you find it?

A. The nearest point to the K. K. or Utah tunnel?

Q. The K. K.? That is southeast?

A. The nearest point to the K. K., I think, is in the Eureka 8½ level. If you will show me on the map; I have never examined as to that.

Q. In the Eureka 8½?

A. Yes, sir. The cross-cut from the Eureka 8½ strikes the hanging wall eight feet from the foot wall. On the map I will show you. The Eureka 8½ is a cross-cut from the Block chamber in the 8th level. I don't know as it is on this map or not, but it runs out on the 8th level and strikes the hanging wall. I can find it on that map. It must be there, I suppose.

Q. You can tell that 8th level by the color all through?

A. I shall have to ask somebody to point it out on the map, for I have not used this map at all, but I have my notes very clearly.

Q. Then, as you don't know precisely where the point is——

A. [Interrupting] I can tell you where the point is.

Q. Can you tell me the distance the point is?

A. I think I can tell you the distance [examining notes].

Mr. Garber.—Mr. Reed will point out on the map the point you want.

Mr. Raymond.—Let Mr. Reed make a figure where the 8½ level of the Eureka strikes the shale.

Mr. Reed.—That is at 8½ "A."

375 Witness.—Oh, yes! It is put here as a cross-cut. It runs back from here. Here is the Block chamber. That is where I went out from, but I could not tell it. It runs out from the 9th level cross-cut. That I suppose to be a good deal nearer than the Utah tunnel.

Mr. Wren.—Q. How far is it?

A. What is the scale of the map?

Q. The scale is 40 feet to the inch.

A. Between 400 and 500 feet horizontal measurement.

Q. And it is about 600 feet perpendicularly? Lower than the shale in the Utah tunnel, is it not?

A. I should think it would be; because the eighth level of the Eureka is below the Bell shaft; but I do not know the exact level of the tunnel.

Q. In a straight line, between the shale in the Utah and the shale at the point designated as "8½ A," the distance is greater than it is to the shale in a K. K., is it not?

A. Excuse me. From the Utah tunnel to this [pointing]?

Mr. Wren.—Why, of course. From the Utah tunnel, or from the Bell-shaft tunnel. As the Utah tunnel is not on the map, I may use that term, as they are near together. From the Bell-shaft tunnel, on a straight line, an inclined line, to point "8½ A," would be a greater distance than it is from the shale in the Bell-shaft tunnel, to where you find it in the second level of the K. K.

A. Undoubtedly not.

Q. Well, it is about 600 feet, is it not? To get at it as rapidly as possible?

A. Yes, sir; I should think it was over 600 feet.

376 Q. Now, if such intercalations of shale and clay are frequently found in the limestone, and shining out in all directions, is there any certainty that the shale that you find in the Bell-shaft tunnel is the same shale that you find in the 8½ level of the Eureka Consolidated?

A. Certainly, there is not. A strong probability, amounting in practice to a certainty, and quite sufficient to control mining operations, there is.

Q. To control mining operations or mining suits? Which?

A. Mining operations. To control, for instance, the direction of mining drifts made by mining superintendents, so that they would keep within that shale.

Q. Well, you think, as I understand you, that the shale that is found on the Richmond 7th and 8th level, and the shale found in the Bell shaft and Utah tunnels, and the shale found in the 8½ level of the Eureka, and in the 9th level of the Eureka, and in the various levels of the K. K., are all the same?

A. I think they are.

Q. Notwithstanding the fact that the developments do not reach within hundreds of feet of each other?

A. I think so, sir.

Q. And notwithstanding such intercalations are frequently found occurring in the limestone; thinning out in all directions?

A. Yes, sir; not in this limestone [pointing], that I am aware of.

Q. In what respect does this limestone differ from any other?

A. In this respect: that such intercalations thinning out in all directions have not been frequently found in it.

Q. Have any developments been carried on for the purpose of finding them?

377 A. They might have been; but they have not been.

Q. What is your opinion now about the fissure or clay or whatever you call it that you find between 7 H and 7 G? Is that the hanging wall of the lode or not?

A. As I have just stated, I think the hanging wall of the lode—if you consider it the hanging wall of a lode—seems to have been split at that point. There seems to be the result of a break, which is a departure from the general course or apparent course of the hanging wall. And the body of clay which has gone to the eastward there, in my judgment, more nearly resembles the clay of the roof of the hanging wall than it does this little seam [pointing]. That is to say, if you will allow me, I think that characteristic clay is that which starts from here [pointing] and apparently comes up to there [pointing] and comes in again. So that would be, if you had to take your choice, the hanging wall. But we frequently have to take our choice in such cases between two fissures on the the hanging wall, and it is not a matter of any importance. That would enclose the stratified limestone in the vein.

Q. Does the clay that is found at "7 F" on the 7th level of the Richmond pass through the point "8 E" on the Richmond 7th level?

A. There are two clays found on the 7th level; but it is the one that crosses it at that point [pointing]. I will give you a frank statement of it. There are two clays found at this point. One is this little reddish and thin clay seam found in here—not more than six inches that is traceable, running in this direction. The other is that clay which approaches this cross-cut at this point. This,

from its direction and appearance, I am positive, very sure,
378 connects with that [pointing], although there is nothing between them to prove it. But appearance indicates to me that they do connect.

Q. Does the clay seam, as we call this which you find between "7 H" and "7 G," join the clay seam that is found at "7 F?"

A. I think it does at "7 F;" but I don't know whether it does at the other end.

Q. Do you recollect a large body of ore which is in here? Right along in here?

A. Yes, sir.

Q. In the Richmond 7th?

A. Yes, sir; that is, I recollect ore along here [pointing].

Q. I was speaking of it here [pointing].

A. I don't recollect much about that at present. I don't recollect a body of ore here [pointing].

Q. Not on the Richmond 6th?

A. I do remember a body of ore in there [pointing].

Q. That is on the 8th level. Do you recollect a body of ore here? [pointing.]

A. Ah! well I might. I believe I do remember a body of ore in the Richmond 6th.

Q. Do you recollect a fissure with the same course and the same dip found at about the point you would cross to find it, if this fissure continued up to the Richmond, which is running along for about 150 or 200 feet?

A. In the sixth level?

Q. Yes, sir.

A. If you will show me where, I will tell you.

Q. Right immediately above this [pointing].

A. But the sixth level is not out there.

Q. They have not got it down.

379 A. I don't remember any sixth level over there; I never examined any sixth level over there.

Q. I understand you, then, to say that you think that the clay that crosses from the 7 E to the 8 E is the real clay wall of the lode?

A. It looks so to me.

Q. I was mistaken myself; there is a body of ore on the seventh level at the point I designate, lying to the southwest of the tract not indicated on this map.

A. It is not indicated on that map; it lies several feet from the shale, and is a considerable body of ore; I have a recollection of that body of ore, except that I do not remember that it lies several feet from the shale; my recollection is that it lies in contact with the shale.

Q. You know there is such a body of ore there?

A. I think I remember that.

Q. Did you ever attempt to trace that fissure between 7 H and 7 J in that body of ore?

A. No, sir; I cannot very well trace a fissure in a body of ore, because the body of ore has either been worked out or not. If it has not been worked out, or if it has I could not trace it.

Q. Do you know whether that fissure ran into that body or not?

A. I do not know.

Q. You cannot say whether it does or not?

A. I do not know.

Q. Do you find any clay in the fissure between 7 H and 7 J? I believe I have the letters right.

A. 7 J is away over here [pointing].

Q. Then I have it wrong. Between the 7 H and 7 G?

A. Yes, sir.

Q. There is clay found in that fissure?

380 A. There is clay, so far as my judgment goes. My judgment is based on the physical characteristics, however. I would say that we have a simple test for clay in the ground among theminers. If the stuff is plastic and will bend we call it clay. If it breaks and is sandy, we say it is not clay.

Q. You refer me to your book of 1873 for what you had to say about the Eureka Mining District before recess. Did you say anything in that book making any reference to Ruby Hill?

A. I do not remember distinctly, but I said to you if you would get the book—it was written after I had visited the place—you would probably find out. I also said I presumed it was the one published in 1873. I have no certainty about either, but if you will let me take the book I will tell you at once. The trouble is, the dates are so contradictory, owing to the delay of the government printer, that I cannot always remember.

Q. Do you recollect whether you made a report in 1873 containing some description of that district?

A. Oh, I think every report I have made from '68 to '76—no, not from '68 to '76, but from '70 to '76—has made some allusion to the Eureka.

Q. If there was anything incorrect in the report after it had been made to you by the person you selected to make it there, you would have corrected it in subsequent reports?

A. No, sir. I would not have referred to it at all. I have never had time to do that. I have had to make these reports, one volume a year, to read all the proofs, and compare all the manuscript, and it has been utterly impossible for me to make more than a very general reference to past reports. If the latter information

381 contradicted the previous one, I simply published the latter one in the latter volume, and let them find it out among themselves.

Q. Were you ever at Dunderberg?

A. No, sir.

Q. You reported on the Dunderberg in 1873, nevertheless, did you not?

A. Very likely.

Q. You are in the habit, then, as I understand it, of incorporating in your reports, reports by other parties?

A. Do you mean in my government reports?

Q. Yes, sir.

A. My office is that of commissioner of collection of mining statistics, and I am in the habit of collecting them and publishing them, consequently they come from other parties almost entirely.

Q. You did not confine yourself to mining in your works, did you?

A. I did; as I understood the scope of my orders, and acted under a letter from the Secretary of the Treasury, which told me what to do, which you will find in my report of '69, at length.

Q. Did you ever visit the Bullwhacker?

A. I do not remember it.

Q. You do not know whether you reported on it yourself or whether some one else reported on it for you?

A. I am pretty sure I did not myself.

Q. It is hard to tell precisely what portion of your reports, then, are your own and what belong to other people?

A. It would be impossible to tell, unless you ask me in regard to a given passage, and then I will tell you.

382 Q. Did you ever report that the Lord Byron, Valentine Day, Bajazet, and Ida were pipe-claims?

A. I don't know. If you will allow me to look at the book I will tell you. [Examines.] This volume contains the account of mines which I wrote after I had visited them personally. It is based on my personal observations, together with certain characteristics of later developments made between the day of my visit and the day of the printing of the report. So far as the Eureka and K. K. mines are concerned, there are certain workings on the Ruby Hill. I gave my opinion based on my observations at the time. So far as the passage to which you call my attention is concerned, it does not contain my own individual opinion, because I did not visit the mines enumerated, neither did I say anything about pipe-veins.

Q. But the work contains something about pipes?

A. Yes, it contains a statement about pipes.

Q. Is there a difference between pipes and pipe-veins?

A. Yes, sir; the difference between pipes and pipe-veins——

Q. [Interrupting.] You know very well that the term pipe there is used in reference to pipe-veins, is it not?

A. No, sir; I deny it. I not only do not know it, but I know to the contrary.

Q. You have not written anything in any of your books in reference to the formation of the Ruby Hill?

A. Yes, sir.

Q. In what way?

A. I think that one which you have there contains it; if not, I can easily find it for you in the previous one.

383 Q. I should like to have you. The formation, I mean, now, in the character of the ore.

A. I think you have Ashburner's affidavit. I am afraid you would not be willing to admit that Ashburner's affidavit was ever endorsed by you.

A. To save the time of going through my book and finding it for you, I can tell you what I said.

Q. State what you said, then.

A. I said that on Ruby Hill the deposits appeared to occupy a contact line along the quartzite, and some of them have curved into the limestone, entirely away from the quartzite.

Q. You stated that in the book long before you visited the district.

A. That may be; but that was the impression I had concerning it.

Q. An impression you got from somebody else, it appears.

A. An impression I had after, after visiting the district, as I distinctly recollect. But, after I visited the district, I was very careful not to commit myself to any theory about the foundation in advance of more careful investigations on my own part, and greater developments in the mine.

Q. What portions of the Richmond mine have you ever visited?

A. The 200, 500, 700, 600, and 800-foot levels, the Lazette channel, the old Richmond, the incline, the 200-foot level and winzes, the 3d and 4th and 2d levels, and other portions of the mine.

Q. You visited the 8th level of the Richmond?

A. Yes, sir.

Q. Between what points?

A. I think I have been throughout the whole of the 8th level.

384 Q. What did you find in it?

A. I found intersection of the quartzite, 50 feet from the shaft. The shaft, at that point, being in quartzite. These distances are my own pacing, and are not accurate. The shaft itself, at this level, is in the quartzite.

Q. And you found clayey matter along the quartzite?

A. I found the intersection of the hanging wall clay at the end of the cross-drift; that is, the clay at "7 L," I found in here, between "7 L" and winzes down. I found in the vein about there, I think, a considerable exposure of a fissure-plane running in the wall of this drift, on the right hand side of the drift, northeast and southwest for 66 feet, according to my own pacing. I found in a cross-cut about 21 feet back from the end of this drift, in the end of this space of limestone——

Q. [Interrupting.] In cross-cut 8 D?

A. In the cross-cut 8 D, I found there was another smooth wall, course northwest and southeast, dipping east.

Q. Give us everything you found on the level, as fast as you can.

A. That is all.

Q. What did you find on the seventh level? Did you visit the whole of it?

A. I think I went through the whole of the seventh level.

Q. What did you find on the seventh level?

A. The seventh level is also in quartzite, and an intersection of foot wall, cut about 45 feet through the shaft and the drift, following the quartzite for about 70 feet; I found also on the main level, after passing through small ore-sections, the level entering into the hanging wall and returning again from here down to here:
385 7 F to 7 J; there I found the level entering the hanging wall and returning again into the vein; I also followed to 7 K and connected with the winze into the level overhead; I also proceeded out beyond 7 E, a second cross-cut or branch from 7 G to 7 H, and from 7 G to 8 E. No, from 7 G to 8 E, I did not examine it the first time, but the other time I did; so I have examined it from 7 G to 7 H and to 8 E, and found the heavy clay at 8 E and the thin clay along the whole level from 7 G to 7 H; I also examined the point at 7 F and found the clay there; I think that came off of this southern branch, but I do not now recollect, and it may not be important.

Q. That is all you found on the other level?

A. That is all I now recollect.

Q. Did you visit the 6th level?

A. I did.

Q. What points?

A. I visited the 6th level at the points 6 F, 6 G, 6 H, and around to the winze near 6 L. I also ascended from that level to the 5th level, in the Potts chamber.

Q. What did you find in that level?

A. I found the intersection of the hanging wall at 6 F, 6 G, and 6 H. I found a connection of ore through the drift near the point marked 6 J, into the workings of the 10th level of the Eureka.

Q. Did you visit the 5th level?

A. I did not, except so far as the Potts chamber may be called the 5th level; I went through the Potts chamber.

Q. You did not visit any other portion of it?

A. No, sir; I do not think I visited any other portion of the 5th level.

Q. Did you visit the 4th level?

A. Except in going down from the 2d level, I did not. I
386 I will show you just where I was. In going down from the 2d level through this series of winzes, and through the works in the Potts chamber, I crossed the 4th level, but I did not travel on the 4th level.

Q. You did not examine the 4th level at all, then?

A. Beyond that crossing—probably a few feet—and such slopes as led to it, I did not.

Q. Did you ever examine the 3d level?

A. Yes, sir. No, sir. I did not. Wait a moment, I have got the wrong page. I did not examine the 3d level.

Q. Did you examine the 2d level?

A. I did not examine part of the second level.

Q. What portion of it?

A. From the shaft to the point 2 A, 2 B, 2 C, 2 D, and 2 F, in to the end, I believe, if it is opened.

Q. What did you find in that level?

A. I found, at or near the point 2 B, ore, and from there to 2 C, ore, and from 2 C to this other 2 C—there are two 2 Cs—ore again. There is a small ore exhibit in the 7th level, running along there with intervals of interruption, but a more or less continued seam.

Q. Did you visit the 1st level of the Richmond?

A. Is the Lazette tunnel the first level?

Q. No, sir.

A. If not, I did not. I do not know what the first level is exactly.

Q. Well, there is no first level. You visited the Lazette tunnel, did you?

A. I went down from the Champion through to the Lazette tunnel. I went through all these workings.

Q. You visited the Lazette tunnel?

A. Yes, sir.

Q. And went through it—the whole length?

387 A. I did.

Q. What did you find in it?

A. I found at several points in the Lazette tunnel stains of ore, small impregnations of ore; that is all.

Q. At what points?

A. I did not record them. They are marked on the map, but I do not undertake to identify them from memory.

Q. What was the balance of the tunnel in?

A. Broken limestone.

Q. Very much broken?

A. I think so.

Q. Did you visit any other portion of the Richmond mine except this tunnel?

A. The old Richmond incline.

Q. You went down that incline?

A. Yes, sir.

Q. You cannot see much in the incline except the old stopings?

A. You cannot see much in the inclines. I visited the winzes on the 2d, 3d, and 4th levels, and went down to the caved ground; so in speaking about the different levels, you must understand I have been above and below them to some extent.

Q. That is all the workings of the Richmond mine you visited, that you have described?

A. That is all, I believe.

Q. What workings have you visited in the Eureka? Just give

me one level to start with, and then we will go through with the balance, after we get all you know about the level given.

A. Suppose we begin at the top of the Lawton tunnel. I have had no time to arrange my notes, and they are all just as I
388 happened to make them. [Examining notes.] Lawton tunnel: I started at the mouth of the tunnel and proceeded westerly through the tunnel, finding small bodies, stains, and impregnations of ore at different points in the tunnel, and some places where there were no such impregnating bodies.

Q. And no stains?

A. And no stains. I proceeded through this to the Buckeye shaft, and followed the two branches through the Buckeye shaft out to the quartzite. I also went through a winze to a level 28 feet below the surface, and in that way through to the surface, under the outcrop workings of the Buckeye, on the south side of the course of the hill, in that way observing what was lying on the ore-body. I then proceeded along the hill through the Richmond, and examined the outcrop, or what are now called the outcrop-bodies, which I was informed were not the outcrop-bodies when they were first opened, but that there was limestone on top of it.

Q. You have testified to a good deal of what you have been told?

A. I do not care anything about it, but still it is not the best testimony in the world.

Q. I wish you would confine yourself to what you know individually.

A. I was trying to tell you that I did not know that these were the outcrop-bodies. They looked so.

Q. You told me also, at the same time, that other people told you they were not?

A. Yes, sir; and I can prove it.

Q. What was the next level that you visited?

A. The Eureka 5th.

Q. What did you find in the Eureka 5th?

389 A. I found, first, the intersection of the foot wall about 170 feet from the shaft, and then continuing along the foot wall, north by west, nearly 600 feet. This is the drift. It runs out from the shaft and intersects the foot wall about 170 feet from the shaft, according to my notes. Here it is. It continues along the foot wall. The shaft is in the vein. It intersects the foot wall about 170 feet west of the shaft and continues along the foot wall about 600 feet, according to my notes, to and beyond a point under the Bell shaft, under this level. The level shows, along the contact line, manganese, or so-called manganese, and ore stains, and at several points bodies of iron. I think this is the barrenest level that I have seen in the mine. There are places, considerable distances, where I did not observe any stains or bodies of large extent. Before reaching the Bell shaft, save about 500 or 600 feet from the Lawton shaft, there is a large cavern or caved ground, under which

the bonanza of the 7th level is located, and in the body between I did not see it. [Marking it.] I went out from here into it. [Pointing.] I also followed this 5th level beyond the point where I speak of it as coming under the Bell shaft, beyond this point marked Bell shaft, to the westward along the foot wall for a considerable distance farther, and descended from it through winzes into the 7th, 8th, and 9th levels.

Q. Through the winzes?

A. Yes, sir.

Q. What was the next level visited? The Eureka 7th? There is no 6th level of any length.

A. No. The Eureka 7th.

Q. What did you find in the Eureka 7th?

390 A. My first entry into the Eureka 7th was in climbing down the winze at this point. This winze at the point marked Bell shaft, I went down to the 7th level on the quartzite all the way down on the foot wall all the way to the 7th level. I followed the quartzite foot wall in the 7th level for 200 feet west of that point. This was at my first visit; contact showing good ore.

Q. All the way?

A. For this 200 feet. I then returned, and passing through the bonanza under the caved ground in the 5th level. This is the caved ground which you have just pointed out to me. This was before knowing the bonanza, however. This level leaves the foot wall, and does not cut it again until it is cut obliquely 50 feet from the Lawton tunnel, which is at the 7th level in quartzite. I have also since that time entered the 7th level from the other drift and examined the ore at this point marked "7 M," and for 25 to 35 feet northwest "7 M," and to some distance east; a part of the level which I think was not constructed at the time of my former visit; but if so, I do not think I entered it.

Q. What kind of ore do you find from "7 M," on the 7th level, to "7 T?"

A. I do not remember finding ore from "7 M" to "7 T." Is "7 T" on the 7th level?

Q. Yes, sir.

A. I only remember going a certain distance, a few feet, 30 feet west "7 M." I do not think I went so far as "7 T." I know that I found ore as far as I did go west "7 M."

Q. You did not go west "7 M?"

A. Yes, I did; but only twenty or thirty feet; but whether so far as to the end there I cannot say.

Q. You did not find any ore there?

391 A. I did find ore there.

Q. What kind of ore?

A. Ordinary red ore, charged with lead, and also grey carbonate ore.

Q. Workable ore?

A. O yes, sir.

Q. All the grey ore is fine ore, is it not?

A. There is a material in the mine that looks like the grey ore that is not good; but all the grey ore in the mine is fine ore.

Q. Did you visit the 8th level next?

A. Yes. I went out to the eighth level from the Lawton tunnel. I struck the foot wall 600 feet west of the Lawton tunnel, and followed along the contact about 300 feet farther. I also saw a section of the foot wall at or near the shaft, which is still at the 8th level in quartzite.

Q. What did you find there?

A. In the 8th level?

Q. Yes, sir.

A. The principal developments which I remember in the 8th level are the new developments here [pointing]. I do not remember anything about the 8th level here except above and below it, where I went through some of these ore-chambers. The level itself I cannot recollect distinctly.

Y. You do not recollect anything about the 8th level between the points 8 D and 8 E?

A. Between those points 8 D and 8 E I do not have any notes on the 8th level, and I have no distinct recollection about it.

Q. Have you not a sort of indistinct recollection that it was all limestone?

A. It may have been all limestone; I have no recollection about it.

392 Q. You visited the 9th level also? What did you find there?

A. In the 9th level I commenced at the shaft and went out in this direction to the point 9 B, crossing the foot wall at about 50 feet from the shaft, going into the vein, and going out to the point 9 B, where I followed this cross-cut towards what was supposed to be a portion of the hanging wall, and this cross-cut does not reach the hanging wall.

Q. It reaches the water though, does it not?

A. It does. The water comes in from that side. I then proceeded along northwesterly to 9 C, where I followed this cross-cut, and found it did not reach any hanging wall or any clay. From 9 C I went southwest to the point 8 S, where the quartzite is hard. At the point 9 E it is cut by a drift westerly, showing the line from these points to be about as sketched in the map. I then proceeded back here and up into the main drift, which goes on nearly straight, in a northwesterly direction, and at the point 9 S, off that side, it enters the quartzite, and continues in it for 210 feet, comes out at the point 9 T, and goes on in a straight line after that to the ore-chamber in the 9th level. At these points marked in red I observed the ore stains in this drift.

Q. You observed ore stains in the drift?

A. Ore stains and ore-bodies, small ore-bodies.

Q. Very small ore-bodies?

A. Yes, I suppose you may say very small ore-bodies; none very large.

Q. As big as your head?

A. Yes, as big as your head.

Q. You did find good ore when you came out here [pointing]?

A. Yes, sir.

393 Q. Now, as a matter of fact, you found a comparatively great zone of barren limestone lying between the deposits of ore situated out here to the southeast, and the deposits of ore to the northwest, did you not?

A. I did not call it a great barren zone of limestone, and do not consider it as such.

Q. Did you not find a great zone of barren limestone lying between ore-bodies at the southeast and ore-bodies at the northwest of these claims?

A. I reply to that, that in a single level, taken by itself, you will find large barren intervals; but if you take all the levels together, that I have examined up to the surface, you will find there is no such barren interval, but above and below it there is an ore-body.

Q. Let me ask you this: Do you consider occasional bunches of ore from the size of a walnut to the size of a man's hand, as really breaking a barren zone of rock?

A. If you are asking whether it would be a mine, I should say it would not. Economically, they do not.

Q. But, I ask you, would it not be considered a barren zone of rock, notwithstanding you might find here and there, occasionally, little bunches of ore?

A. That is a question of judgment. In my judgment, no.

Q. Are not those little bunches of ore separated from lodes and veins found in all mineral districts short distances away from the veins?

A. No; not in all.

Q. There is a cave immediately above this body of ore, at the Eureka 9th level?

A. I believe there is.

Q. What do you find in that cave?

394 A. I found efflorescences on the walls and material on the bottom, a great deal of which has now been shoveled in, so that it cannot now be recognized.

Q. You find a cave there in the limestone, imbedded?

A. Yes, sir. I did not see limestone anywhere in that cave, clear limestone, because the whole surface of it is more or less covered with ore matter.

Q. But it is a cave in the limestone?

A. Yes, sir.

Q. What do you find in the winze extending from the cave up to the point 8 K on the Richmond level?

A. At this point in the cave here I followed the ore in the side of the cave still remaining, and found the body of the ore standing and not yet extracted, and connected it with this winze and then followed this body of ore all the way up into the 7th level.

Q. You followed the winze from the body of ore at the end of the Eureka level; you followed a winze containing ore up into the cave?

A. Yes, sir; up into the cave.

Q. And then you find the sides of the cave covered with ore?

A. Covered with ore.

Q. What did you find in the winze from the cave up to the 8th level?

A. A seam of ore of the quartzite.

Q. What was the thickness of that seam of ore?

A. The seam of ore up to the 8th level is in some cases, as a minimum, as thin as an inch and a half, and as a maximum I should say, between those two levels, a foot.

Q. You don't think it is as barren as this floor, do you?

A. Which floor?

Q. This floor right here.

395 A. There is no place in it that there is not six inches anywhere along the line of exposure, or three inches where you can't find ore.

Q. What did you follow from "8 K" on the 7th level to the bottom of the winze "8 J?"

A. On the 8th level I followed a seam of ore?

Q. What did you follow from "8 J" up the winze to the 7th level at "7 M?"

A. A seam of ore.

Q. What did you follow from "7 M" on the 7th level to "7 T?"

A. I have told you already that I don't know that I went to "7 T." I followed from "7 M" on the 7th level some distance west.

Q. I believe I examined you on that level with regard to everything except the winze. You are sure there is ore in those winzes?

A. I am.

Q. What course does the quartzite run at the end of the 8th level in the Eureka Consolidated?

A. I don't remember.

Q. What course does it run at the end of the 7th level in the Eureka Consolidated?

A. I don't remember.

Q. You don't remember its course at any of the points above there?

A. I don't remember the course of the quartzite at any single

point, or rather at any short exposure of 2 or 3 feet; because I attached no value to any such course.

Q. You don't?

A. No, sir. It has no signification, I think, or very little.

Q. Is the ore-chamber marked "5th level" on the quartzite or away from it?

396 A. The ore that they are now working?

Q. The ore that they are now working up from the 5th level?

A. On the quartzite?

Q. On the quartzite.

A. I think it is. It goes to the quartzite, in my judgment.

Q. Does it not extend up into the limestone?

A. Very likely. But it goes to the quartzite.

Q. Worked out, is it not?

A. That body?

Q. Yes, sir.

A. Not by a good deal.

Q. It is not, hey. I would like to have those specimens that were here yesterday. Did you see those specimens that were presented here by Mr. Keyes yesterday?

A. No, sir.

Q. Were you told by any person that we were taking a great number of speimens from below and above ground in these mines there, before you came here?

A. Not that I remember.

Q. You don't recollect it?

A. No, sir. I think I should have remembered it, but I don't.

Q. What is that?

[Defendant's specimen, No. 52, shown to witness.]

A. That part is limestone. I don't know what that part is.

Q. The dark part is limestone, but you don't know what the other part is?

A. That is it. The other part seems to be decomposed; is a little reddened.

Q. Have you no idea whether that came from between the shale and quartzite, or outside of it?

397 A. No, sir.

Q. You could not tell, possibly?

A. I could not tell at all. I never undertake to state on the stand what locality rock shown me is from.

Q. Do you know whether that is a fair sample of the rock from the inside of the quartzite or not?

A. I do not. I don't know how you can get a fair sample of the rock.

Q. How many varieties of rock do you find inside? How many do you think, just at a rough guess?

A. As many different varieties as can be produced of a dolomitic

or magnesian limestone mass by the processes through which it has gone. I cannot tell you the number.

Q. Do you think you have seen 30 or 40 different varieties of rock in passing through these works?

A. I have seen 30 or 40 different varieties in appearance, of which you could take specimens.

Q. 30 or 40 different varieties?

A. In appearance.

Q. Do I understand you to say you have not seen this rock here before?

A. I was at the other end of the room and didn't come near it.

Q. Do you think these specimens arranged here now present anything like a fair specimen of the body of the rock that lies between the quartzite and the shale?

A. I don't think they do. There are only one or two that are big enough to show anything; and those are all covered with dust. I wish to add this: The facts I have described in the limestone zone and between the shale and the quartzite cannot be well
398 shown in single specimens unless they are of considerable size, because the difference consists of peculiarity in the structure pervading the whole mass.

Q. Have you any idea whether that specimen, No. 59, defendant, comes from between the quartzite and shale or not?

A. I have seen such material in quartzite, but I have no idea of where this came from.

Q. You don't know whether that is dolomitic sand or not?

A. I don't. I think it is.

Q. The next specimen is No. 39; what is that?

A. I should judge that to be a piece of quartzite.

Q. It looks very much like a piece of quartzite from the surface of the ground to the southwest of the mines, does it not?

A. I have not been on the surface of the ground far to the southwest, except at one point; and that was, I think, at the Emersley claim, where I went in 1872, where the ore lies on the quartzite.

Q. What are those stains on the quartzite?

A. Apparently ferruginous stains.

Q. Which, being translated, is iron?

A. Iron.

Q. The dark stains and also these yellow stains are iron, are they not?

A. Yes, sir; I presume so.

Q. What is that [showing witness specimen 46, defendant]?

A. I think it is limestone.

Q. Is it metamorphosed?

A. Yes, sir; but I have not used the term metamorphosed at all, and I would like to have you explain it.

399 Q. Well, as I understand it, it is altered limestone.

A. Oh yes, sir. This is altered from what it was when it was sedimentary limestone.

Q. Crystallized?

A. Crystallized.

Q. Metamorphosed may mean a great many things?

A. Yes, sir.

Q. Metamorphosed has very little to do with the formation of lodes?

A. That I have not said.

Q. Do you not say so now?

A. It has a great deal to do with the lining of the lode walls, and the character of the whole lode from the time of its first deposit.

Q. What is that stain [pointing]?

A. Iron.

Q. Do you think that could possibly have come from stratified limestone outside of the lode?

A. Yes, sir; I do. I wish to explain that the metamorphosis to which you and I were both referring is effected by both of these limestones.

Q. Then the limestone both inside and outside of the lode has been metamorphosed?

A. I think so.

Q. Can you tell what that is [showing witness defendant's specimen, No. 44]?

A. That looks like limestone. I am not sure as to its locality. I never saw anything exactly like that.

Q. You never saw anything like that?

A. I said exactly like that?

Q. You never saw anything like that inside of the lode?

A. I never saw a piece exactly like that piece; so I am not sure whether it came from this locality.

400 Very little stain of iron about that?

A. Very little.

Q. Not near as much as there is about the quartzite?

A. Not near as much about that piece as there was on the other piece of quartzite.

Q. Do you think that, from the examination you made of those marks that you have just described to me, you are able to say that the whole mass of that hill is completely broken up and shattered and stained with iron throughout?

A. The whole mass of that zone in that hill?

Q. The whole mass of that zone.

A. It is.

Q. You think, from the examination you have just described, you are prepared to say that?

A. I am; I am as far as I have examined it. I never have stated it, except so far as I have examined it.

Q. You only mean, then, when you state that it is broken and shattered, that so far as you have examined it it is?

A. So far as I have examined it it is shattered and broken up. I have examined it far enough to infer that that extends throughout the whole zone.

Q. You infer that?

A. Yes, sir.

Q. You did find places in that zone, did you not, where you find no stains?

A. I found places where there were no stains. That is to say, I found a place where the area that was left by the mining tunnel running for a few feet through the rock, did not appear to show any stains.

Q. How many days did you spend in the examination of these mines?

401 A. That is a little difficult to say. I think it was eight.

Q. Eight?

A. Yes, sir. I made a memorandum of it. My memory is poor about that. But I am pretty sure it was eight days.

Q. How many days or how many hours did you spend in the Richmond mine?

A. Two days and a half, as near as I can recollect.

Q. How many hours each day?

A. Well, I could not tell you. Six to nine.

Q. Did you spend more than two hours and a half the first day you were there?

A. Yes, sir. I am not certain, because there was one day I went into the Richmond merely as a flyer, after going through another mine. I cannot tell you exactly about that. I am satisfied I spent two full working days and a half a day in the aggregate in these mines. That is my recollection.

Q. Your theory stated in your affidavit was considerably more full than the one that you have stated at the present time, on some points, was it not?

A. Are you referring to my three affidavits?

Q. Yes, sir.

A. Well, there are three of those, and only one of these, so far. I had leisure then. I was sitting by myself, and put in everything. I could think quietly. Now I have tried to cover everything, and probably have failed.

Q. I believe you introduced a flood into your affidavit, that does not appear in your testimony at all, or a very heavy rain at least?

A. I said in my affidavit that at a certain geological period previous to the historical age of man there was a heavier rainfall, that

402 a precipitation of the rain on the interior of this country was greater than it now is; also that at a certain anterior geological period there was more carbonic acid in the water than there now is. But I then said that that was all immaterial, because the

present rainfall and present amount of carbonic acid on the waters were quite sufficient for the processes which I described.

Q. It dissolves most easily in waters charged with carbonic acid and the sulphides of the metals of carbonate of lime?

A. Sulphides of the metals, according to my impression, don't dissolve at all in carbonic acid.

Q. They have to be oxidized first?

A. They have to be oxidized; there has to be a reaction. Sulphides of the metals must be oxidized and an exchange must take place so that you obtain bicarbonates of the metals or else you dissolve the metals as sulphates, in which case the carbonic-acid waters is not necessary to the solution, the sulphates or any metallic oxide being directly and simply soluble in pure water.

Q. Which would dissolve most easily, sulphates of the metals or carbonate of lime.

A. Sulphate of metals are soluble in water that has not any carbonic acid in it, and the carbonate of lime is soluble in water that has free carbonic acid in it.

Q. In your affidavit you charge the waters very highly with carbonic acid from the air, did you not?

A. I did. I beg your pardon; I did not. I said that might have been, but it was immaterial.

Q. Are you sure that you said anything of that kind in your affidavit?

A. I am. I will swear to that, because I read it yesterday,
403 and that is the first time I have had a chance to read it since I made it when I first came to this coast. My recollection is a great deal better now than it was two weeks ago.

Q. As I understand your theory, the metals were deposited originally in similar fissures, extending in every direction through all of this hill, in the form of sulphates and carbonates; is that correct?

A. No, sir.

Q. Well, let us have it, then.

A. As far as my theory goes in the general disposition of the metals, was it not through the body of the hill and this ore only, and not exclusively in small fissures, and also in such cavities as may have been formed, and not in sulphates of carbonates and sulphides of ore.

Q. Then, that process was confined to the limestone lying between the quartzite and shale; subsequently, the sulphides were oxidized and carried to their present position in the limestone in the shape of carbonates and oxidized forms. Is that correct?

A. It would be very unlikely that the metals would be carried out in these cavities in the form of sulphides.

Q. That would not be picked up, as sulphides or sulphide body, surface of the water.

A. It is not likely that would be picked up as sulphide by surface

waters, and carried in sulphides and deposited in sulphides in their present position.

Q. Was that after they oxidized?

A. There is a certain process going on in these deposits in this country which reform the sulphides, on which I have observed in various mines, and among others, I think, in the Eureka mine, and I am inclined to believe that the black carbonated ore to
404 which reference has been made, and which I have mentioned myself, has reconstructed the sulphide; but with that exception it does not apply, in my judgment, to the crystallized galena, but only applies, if at all, to those dark materials referred to, which I believe must contain some sulphurate of lead. With that exception, I don't think the ores were deposited by secondary action of sulphides.

Q. Have you any crystallized galena? Did you find any other in these mines and the works about them?

A. I don't know.

Q. Do you find that surrounded by carbonates and oxides?

A. I do.

Q. You urge that as one reason, in your affidavit, for your theory in regard to the exudation and subsequent deposition and the metals were correct?

A. Yes, sir.

Q. In what way does it prove the correctness of your theory in relation to the oxidation and subsequent deposition of the metals?

A. It proves the correctness of the theory in relation to the oxidation, but it does not prove anything about their subsequent deposition. It proves one-half the theory but not the other half, which is proved by other evidence.

Q. You do find these bunches of galena, from the size of your fist or the size of a walnut up to the size of that model, in the oxidized carbonate ore?

A. I should not be surprised to find them that size, but don't remember any as large as that.

Q. Does that not prove that the metals occupy now precisely the position that they occupied when they were first deposited, and not that they have been oxidized and dissolved out of the rock above and redeposited in the caverns where found?

405 A. No, it does not.

Q. Why not?

A. Because it does not prove anything. It is impossible that the galena should occupy the same position as before; but the deposits around that galena may be and partly are deposits of oxidization and partly deposits made outside of that original was by percolating waters since.

Q. What held the water in suspension in these caverns until the oxidized mineral was carried in by the waters and redeposited around them?

A. I don't think it was held in suspension.

Q. How is it, then, that you find it in the midst of the oxides and carbonate ores, if it was not held in suspension? Your view is this: the galena existed in the limestone in small bunches?

A. In such a case as that.

Q. And that as the metallic oxidized above, it was carried down by waters encircling the limestone, which was dissolved out from around the galena, and the oxidized metal in its place; is that it?

A. No, sir.

Q. What is it?

A. You have left out the mass of iron pyrites, arsenical pyrites, and zinc-blende, which may have accompanied the galena. My theory is, that in cases where galena is still found in places right in the centre or nucleus of such a mass, there is no doubt that it indicates a secondary origin of the oxides. I am ready to admit, though, that I don't know for certain that this is the case. It is not the case in all ledge deposits that those lumps of galena occupy their original position; but there are evidences in abundance showing that
406 in many places where there is no such nodular filling, and also in places were there is such nodule, but away from and a considerable distance from the belt, there is a stratification of ore that has been brought in and deposited. I have occasionally observed that stratification around the claim. I observed it in the winzes from the 10th level of the Eureka, which I visited in April. I have observed it in the winze of the 7th level of the Eureka, where I did not find a central nugget of galena. But at the bottom of the 12th level winze I did. I found that same structure that we had above, an original mass oxidized in place, and subsequently an amount of iron oxidized on top of it.

Q. Do you know whether or not it is a fact that these nodules of galena are found mixed through the carbonate and oxidized ores in every few feet?

A. I don't know it from personal knowledge of this deposit, but I could believe it at once, because it is the character of such deposits.

Q. If that is the case, would not this be the most probable solution of the position of which the galena was formed: that the metals were deposited irregularly in these large caves in the form of sulphides, and that the oxidation commenced at the outer edge of these deposits and extended in towards the center; the outer portions completely oxidized and more central portions being protected, and, from the action of the oxidizing forces remaining in the form of oxides.

A. No, sir; for this reason: the conversion of galena to carbonate of lime increases its bulk 28 per cent., and you could not possibly convert enough of galena to carbonate, in places, without having to get rid of 28 per cent. of that in solution, which would flow away and go somewhere else.

407 Q. You say that in the formation of carbonate, by the oxidation of galena, the bulk is increased?

A. Yes, sir.

Q. In what way is it increased? What is added to increase it?

A. Carbonic acid. There is oxygen added to the lead and carbonic acid to the oxide of lead, and sulphur is taken away. So you have the decrease of the weight of the sulphur and the increase of the weight of carbonate of lime. The precise amount of bulk I cannot give you.

Q. What is the quantity of sulphur contained in galena?

A. I cannot tell you from memory; I can give a guess.

Q. Give a guess. We have to do a good deal of guessing in this case.

A. It is rather absurd to ask me to guess when you can look at a book and find out. It is about 12 or 15 per cent., I think.

Q. What is the amount of carbon taken up by the lead in the process of oxidation?

A. I do not know. I never oxidized lead myself. My statement is based on the authority of Bishop, the geological chemist, whose work I have here and will offer you as authority.

Q. You find large bodies of oxides combined in connection with these bodies of lead?

A. Yes, sir.

Q. Is there anything added to the bulk of the iron in the process of oxidation?

A. There is.

Q. What is it?

408 A. By turning the sulphide of iron into the sulphate of iron, and subsequently into the hydrated peroxide of iron, an increase in the bulk of the iron takes place. In the first place there is an increase in weight, and even in bulk; in the second place, if the mass is solid, an increase is due to the fact that the original solid mass is now a porous mass.

Q. If I understand you correctly now, your position is this: that it is not possible that those caves could have been filled with galena which was subsequently oxidized and carbonate of lime formed, simply because there would have been an increase in the bulk of the lead, and, therefore, not room in the caves to hold it.

A. My statement is that sulphide of lead or galena, imbedded in rock, cannot be transformed into carbonate in the same space it originally occupied without a part going away to leave room for the rest.

Q. What is the quantity of sulphur contained in the iron?

A. In iron pyrites 20 or 30 per cent. I do not remember exactly.

Q. Now, you say that cannot be done; yet Nature that all the time, is it not?

A. No, sir.

Q. Are not lodes of galena being constantly transformed into

carbonate of lead all over the State of Nevada, wherever lodes are found?

A. Without escape of galena in solution, no, sir.

Q. Could there not be an escape of solution as well in the original Eureka or Richmond mines, where it has so tremendously shattered a limestone, as in any other district?

A. That is what I state; it would have to escape. You
409 asked me if it could occupy its original position. I told you no; that there was 28 per cent. increase which collected in these breaks and, wherever there was a chance, on the quartzite and on the bottom of the cavities.

Q. Would not the iron accompanying the galena in the deposits be very much more diminished in bulk by the process of oxidation than the lead would be increased?

A. The iron accompanying is not diminished at all by that process, but increased.

Q. What is your authority for that; you say you have it here?

A. It will take me some time to find it. But with regard to the iron, I do not need to take any one else for authority, for I know something about that myself.

Q. You are about the iron as you are about the lode, are you not—speaking from hearsay?

A. I am trying to tell you frankly when I do know personally and when I do not.

Q. You say there is a general hanging wall overlying the ore-deposits on Ruby Hill, and that the water cannot penetrate that shale. Is that correct?

A. Yes, sir. It cannot come through it from the outside. It might penetrate it downwards.

Q. About where does that shale hanging wall run on the surface, in your opinion, from where it is found in the Bell-shaft tunnel going towards the southeast?

A. I do not know and I cannot tell you where, because I have never seen it on the surface at any point east of the Utah tunnel, until I saw it on the Jackson tunnel. Therefore I do not know how it would run around here; but I found it had to go around a point of quartzite to get into the Jackson tunnel.

Q. You find it here on the 2d level of the K. K., at some place, do you not?

410 A. Yes, sir; I believe so.

Q. That is pretty well up towards the surface, is it not?

A. A couple of hundred feet down.

Q. The dips of that shale would carry it, in approaching the surface, farther to the southeast, would it not?

A. Yes, sir.

Q. There is a large stream of water bears right down into the end of the cross-cut there, is there not?

A. Yes, sir.

Q. Where does that water come from, and how does it get through your shale?

A. It does not come through the shale. It comes down along the shale, within the vein, in my judgment; because wherever they have cut the shale it does not get any increase of the water behind it.

Q. Why does not that water flow along, if it comes down between the shale and the limestone, between the limestone and shale into the Richmond mine, the lowest workings there are on that hill, instead of running off into the space towards the Eureka Consolidated?

A. Because the tendency is to flow vertically down, and in flowing vertically down it will run into the first fissure it meets; and if it cuts the foot wall before it gets to the Richmond, you will not find it on the hanging wall of the Richmond.

Q. If it comes from the surface down to the point of contact between the shale and limestone, why don't it percolate towards the foot wall perpendicularly, if that is the condition down there, shattered and broken limestone?

411 A. Because this shattered and broken limestone is so largely re-cemented and knit together in many places that it cannot get through.

Q. Why is it that you find a great deal of water in the K. K. and Eureka, and no water, or scarcely any water in the works of the Richmond, situated 200 or 300 feet deeper than the K. K. or Eureka, sunk 200 or 300 feet deeper than the K. K. or Eureka?

A. I don't know, sir, and I don't think it is possible for anybody to know in a limestone country why they get water in one place and why not in another; because the water makes its own way, its own channel out irregularly through the limestone; thus you never know where it comes from or where it goes to, until the channel is exposed.

Q. Would not that seem to indicate a very solid barrier between the points where the water comes down to the Richmond claim [pointing]?

A. It would indicate that if this whole zone of limestone had been broken up, it must have been all re-cemented, and consequently have undergone the same action.

Q. Do you know how much deeper the lowest works of the Richmond are than the lowest works of the Eureka Consolidated?

A. I have not made a survey or measurement, but I can say from hearsay. The Richmond 6th level is equal to the Lawton 10th; is 30 feet higher up than the Lawton 10th; so the Richmond 9th level——

Q. Would be 270 feet lower than the lowest workings of the Eureka?

A. Very likely.

Q. And 370 feet lower than the 9th level of the Eureka, as a matter of course?

412 A. Yes, very likely.

Q. And there is a great deal of water in the K. K. and Eureka, and scarcely any in the workings of the Richmond?

A. Yes, sir.

Q. There is some water in the Richmond, is there not?

A. I don't know anything about it. I never saw anything to speak of; I got my feet wet a little; that is all.

Q. You didn't see any water in the Richmond?

A. I paid no attention to the amount of water they met with in pumping. I saw water.

Q. You didn't see any pumping, did you? Did I understand you to say that you found shale and quartzite meeting in the Jackson mine?

A. Yes, within an inch and half of meeting.

Q. And you found—did I understand you to say that you found ore at one point, extending to quartzite and shale?

A. At four points; two points in the Jackson.

Q. What is the width of the ore in these places?

A. In one place it is 1½ inches, and in another place about 12 feet.

Q. You found it extending to quartzite and shale at two places in the K. K.?

A. Yes. At one place in the K. K. I followed it continuously.

Q. About what was the distance from the quartzite to the shale at that point?

A. My impression is, about 200 feet; yes, over 200 feet; that is my recollection. I have the exact amount here in my note book. [Looks.] That is my recollection. I can't find the place in my note-book.

413 Q. How wide is the limestone between the quartzite at the surface?

A. Its connection is from the point "3 D," I believe that is the 3d level, to the point over here, where the 3d level crosses into the quartzite.

Q. How wide is the limestone between the quartzite at the surface about the present Richmond working shaft?

A. Between the quartzite and the shale?

Q. Yes.

A. About the present Richmond working shaft at the surface?

Q. Yes.

A. I think that would carry you right over the crest of the hill.

Q. Take you right up to the Lookout shaft?

A. Yes, sir; but the quartzite there is not exposed, as I understand it, until you get away down to where I was in 1872, at a claim, I don't know the name of it, but it was Emmenley's claim, and there was ore there on quartzite. It was a considerable distance. I could not tell how far.

Q. A singular lode, that commences at nothing, and in twelve or fifteen hundred feet is twelve hundred feet in width; is it not?

A. Not half so singular for a lode to do that as for a sedimentary body, which this was, in my opinion, and yours, too, as I understand it.

Q. Extend it out about 1,200 feet farther, and it would be about half a mile wide, would it not?

A. You can reckon that as well as I can.

Q. It would, would it not?

A. I never extend those things from a single point.

414 Q. I am making a hypothetical case. Suppose it was extended for half a mile farther west, widening as it does now, it would be about a half mile in width, or 2,000 feet at least, would it not?

Q. You assume it widens from the point in the Eureka to the point in the Emmersley shaft; and then assume that it goes on widening until it gets to be half a mile wide. Then it would be half a mile wide.

Q. Suppose you answer my question. I put a hypothetical question to you, which you can answer yes or no. It will shorten the examination very much to answer the questions directly, instead of branching off. If it continues widening, as it does from the Jackson to the Richmond, for 1,000 feet farther to the northwest, it would be at least 2,000 feet wide on the top, would it not?

A. It does not widen from the Jackson to the Richmond.

Q. Answer my question, will you; yes or no? I put a hypothetical case. I want you to answer it.

A. You did not put a hypothetical case. You say, if it continues to widen as it does between certain points. You assume a fact.

Q. I say, if it continues to widen, as it does from the Jackson to the Richmond, for 1,000 feet farther to the northwest, would it not be a couple of thousand feet in width?

A. No, sir. If it continued to widen from the Richmond, beyon l the Richmond, as it does from the Jackson to the Richmond, it would continue to widen in this way. In the first place, it would widen, and then it would contract, and then it would widen again. Because it is 300 feet wide here, on the K. K., and then it is no wider here than on the same level here [pointing].

415 Q. I am speaking of the surface. I called your attention particularly to the surface at the outset of inquiry in regard to the matter.

A. Well, in regard to the width on the surface, that is largely due to the measurement in the heighth of the mountain; that will depend considerably on the dip of the mountain.

Q. I did not ask you about that.

A. You asked me to measure over the top of the mountain.

Q. You spoke of this zone of limestone as being practically a unit. What do you mean by that?

A. Have I said so; that it was practically a unit?

Q. Yes, sir.

A. I mean by that, if I used that expression, that it was a single formation or body of rock that had been impregnated and affected throughout at the same period by the same influences, so as to produce practically a single ore deposit.

Q. I do not perfectly understand the meaning of the word "practical," as you use it.

A. I use it to distinguish it from the word theoretical, which would refer it to the definition given in the books, which I have given you, citing them as authorities.

Q. You think, then, that theoretically it is not a lode? That is, that the definitions given in the books do not apply to it as a lode; but that practically it should be considered a lode?

A. I think that the definition of a fissure-vein as given by the most distinguished authorities on the subject—a simple fissure-vein—does not fairly cover it. Although it grades into those formations which are considered simple fissure-veins, by a gra-
416 dation which I have endeavored to explain, it does not answer the definition of a lode which I gave you when you commenced the cross-examination.

Q. I believe that you did state in your affidavit that this body lying between the quartzite and shale on Ruby Hill resembles a number of different kinds of ore deposits. Did you so state in your affidavit?

A. I don't think I used those words?

Q. But in substance?

A. I said in substance that it contained features belonging to a number of different kind of ore deposits, or which were allied to a number of different kinds. In different subordinate features.

Q. What kinds does it resemble?

A. It resembles the ordinary contact-vein between two different formations of rock, into which vein none of the country rock enters. It resembles that, so far as the seam on the foot wall is concerned. But it does not resemble that in having its large zone of limestone, which is a body made up originally of the country rock. It resembles that class of fissure-veins called veins of attrition, in having spaces occupied by ore consisting of interstices and fissures between fragments of the original country rock; in this case the original hanging rock of the fissure or parting along on the quartzite. It resembles beds, because it is lying in the ordinary formation between quartzite, which is older than the undisturbed limestone, overhanging the clay. It resembles impregnations, because it is largely made up of impregnations. It resembles segregations. It resembles in its minor details true fissure-veins, because small gash-veins are contained in it, and cleavage, which taken by themselves, free and apart from their subordinate relations to the main
417 body, present such texture as to have almost all the phenomena of minute fissure-veins included in the entire deposit. I use the word as —— has used it, in Prime's translation.

Q. What is a cleavage plane?

A. Any plane along which cleavage takes place. I don't like the word. I would prefer the word cleft, which is the simple word used by the Germans in reference to the cleavages in these magnesium deposits. I have often objected to the word, because employed by us in crystalography and in topography, and to indicate the plane of stratification.

Q. Is there any such thing as cleavage in limestone?

A. There is no cleavage plane in limestone, unless it is so clearly stratified as to give evidence of stratification in the shale adjacent to the limestone. But I do not mean to use the word in any of the senses referred to.

Q. Is there any such thing as cleavage plane in limestone?

A. In one sense there is; but I do not mean it in this sense. I mean it in the technical sense; in the sense in which I have used it the limestone is full of it.

Q. But in the sense as it is used by geologists?

A. In the sense—it is used as I understand it in that sense by crystalographers. In the sense in which the word is used by geologists—cleavage along the stratification—there are no cleavage planes in limestone unless they are clearly exposed on that plane. Then it is called shaley limestone. There may be a cleavage along a plane of massive limestone.

Q. Do you find any of these cleavage planes exposed in the works of the Richmond?

418 A. None of these cleavage planes, in the sense in which the words are used by geologists to whom I referred. I ask to withdraw that word cleavage, and use the words fractured planes, or planes of dislocation.

Q. Do you find anything in the Richmond that resembles a w ll?

A. Yes, sir; I do.

Q. To what extent in depth and length?

A. I find besides these faces in the Richmond, which I have described to you as in my opinion a part of the hanging wall, this whole deposit within these boundaries. I find in the Richmond a face in the 8th level, beyond the point marked winze, running northeast and southwest for, I think, 66 feet; and, of course, about six feet in height. I have also seen a face indicating a dislocation and line of movement at the top of the Tip-Top incline, and down to some parts of the old Richmond incline. In the top of the Tip-Top it is seen as far down as you can distinctly see. It is quite visible at various points in the old workings of the Richmond, and I followed it after leaving there [pointing] and crossing the level over to there. In part of the mine I have seen a fissure-plane, or plane of movement, extending from the second level part of the way to the third; and another, extending the rest of the way to the third; and another, extending to the fourth, all occupying a certain general position, a general correspondence of position; but, in my judg-

ment, not a continuous fractured plane. In descending the winze from the second to the fourth level, the surfaces of this wall or plane—which is not a true plane in the geological sense—is seen curved and warped. Its construction is of a peculiar form, like this [showing]. Of course the surfaces are more gentle on the upper side and more abrupt on the lower side; and there were be-
419 low, as between the second and third level, branches of this plane coming up obliquely, or, rather, it divides into two oblique branches; and from the general form of it I am satisfied that it indicates an upward motion of a wedge of limestone rock in the vein, wedging up; that these outlines indicate the effect of the wedging; that the limestone on the outside of the wedge has been more crushed than the limestone on the inside; this is a very common phenomenon. That body may have descended to this position. It is easier to suppose this motion than to suppose that this has been standing still. I followed this down to the third and fourth levels. In the third level I found a short, small cross-cut through this seam [pointing], back under it, and another one forward, in both of which I found ore—both above it, and around it, and in front of it, and on the outside of it. On the wall, as shown in the upper works of the Richmond and Tip-Top, etc., I have observed no ore, because the bottom of the shaft has been robbed clean of ore, or is so covered with dust that you can't examine it minutely. In the old workings of the chamber I saw what I presumed was ore, and in the second level, here. In the winze below I found considerable traces, and I tried every one of the winzes which extend to the fourth level, I believe, and I found large spaces in which this clay was a simple seam, with nothing but limestone on both sides of it.

Q. It is nothing uncommon to find such developments as you discovered here extending into either wall of a vein?

A. No, sir; nothing uncommon.

Re-direct examination of Prof. RAYMOND:

Mr. Thornton.—Q. How does it extend into either wall of a vein?

420 A. It is usually done by decomposition. It is, therefore, nothing uncommon to find it where the wall is smooth and polished. But if it is so, we have simply to assume—if it is a vein at all—that the wall has moved since that decomposition was made, and it is not in its original position.

Q. Suppose the apparent or so-called wall is perfectly smooth and hard, and you dig in it a day and find perfectly continuous ore, what would you call it then?

A. If I found it strictly in one place, and elsewhere the wall was what I practically call the wall of the lode, I should say simply that the ore had, in that place, impregnated the wall of the lode, but if it was characteristically the case that the ore seemed impregnating the wall outside, I should say it was a fissure in a seam, and no true vein.

Q. Did you observe any such condition in the Richmond, and no true wall?

A. That is the condition it takes wherever I have observed this seam at all. And that is one of the reasons, but only one, why I have made up my mind that I cannot class that as a true vein.

Q. That is all the reason?

A. That is one reason. Not the reason, but only one of the reasons why I have made up my mind that that cannot be classed as a true vein; that the ore is characteristically outside of the vein, and this is a peculiarity which is distinctly mentioned by different writers, both by Cotta and others whom I have mentioned this morning.

I would like to make a further explanation, as this is the first time this particular subject has been brought, and if I can give my reasons, I would like to do so.

421 Mr. Thornton.—I have a few questions to ask, and it is about time for adjournment. The examination has been very much extended, and probably the witness is very much exhausted. I know he was sick this morning, which was the cause of his detention from the court-room.

Mr. Justice Field.—Q. Have you any other witness whom you wish to put on the stand this evening?

The Witness.—Mr. Thornton, I do not care to go any further with my explanation, unless you wish to ask me some questions with reference to it. I was going to make an explanation, but I do not care to enlarge the examination.

Mr. Thornton.—Q. You would rather wait until morning?

A. No, sir; I do not care to explain, unless you wish to ask me the questions directly.

Mr. Thornton.—Shall we proceed, your Honors?

Mr. Justice Field.—I think you had better proceed.

Mr. Thornton.—Q. You described passing through the 9th level from the Lawton shaft, an ore-body at the west end, and you said that at certain portions of that level you found ore. You said that those portions of the level in which you found ore were marked, as bearing ore, on the map. What are the appearances of that ore which you found there?

A. Generally it was in the discoloration of the rocks—of the limestone, of the brecciated limestone. And the occurrence of these small caves, usual in limestone, which are always considered signs of approaching larger bodies, by the miners; and fissures in this brecciated limestone in which are ore-deposits.

Q. Do I understand you to say that these ore-bodies might be considered as indicating the approach of larger ore-bodies?

422 A. Yes, sir; they are so considered, in my judgment, and properly.

Q. As such an indication?

A. Yes, sir.

Q. When found in that mineral-bearing zone you consider them as such indication. Do you or do you not?

A. I do.

Q. You have described in your cross-examination, constantly, approaching in these works or reaching the quartzite foot wall. What was the appearance of that foot wall upon the face of it where you approach it generally?

A. Usually on the face of it it is considerably decomposed for some little distance; from a few inches to a foot or two.

Mr. Justice Sawyer.—I don't understand that answer.

A. Usually the quartzite is decomposed from a few inches to a foot or two, so that it constitutes a mass. Outside of that it becomes rapidly hard. Then on this wall of quartzite there is almost invariably, extending over many thousand square feet, a seam of iron oxide, sometimes visible, containing galena and accompanied by a little dark-colored blende, which seems to be characteristic of this foot wall. I have not noticed it anywhere else. It is called manganiferous ore, though I do not know what the analysis of it shows. I think though it does contain manganese, and that is the source of its black color. This I have not seen elsewhere in the vein, except in the contact, and I have seldom found it absent from the contact.

Q. How is the face of that wall; rough or smooth generally? Describe it as it appears.

423 A. Generally, although the wall is so much decomposed, still it is completely exposed in places; and the surface overlying it is freely and sharply defined at almost every point where it can be cut in length by this seam and by the surface over the seam, which is sometimes flush and sometimes striated.

Q. You stated that you attach no importance to the course or strike of that quartzite foot wall where it is found at the ore-body at the west end of the 5th level of the Eureka. Why is it that you attach no importance to its course or strike?

A. If I remember the passage rightly, I said I attached no importance to the course or strike at a single point; because it takes two points to determine the course or strike. To take it at a single exposure along the face of a drift is liable to deceive, because it may be a bulge and of no signification. Where you find the quartzite exposed in many underground workings, as you have here, it is much safer to judge of its general course from point to point than it is from its apparent course at any one point. I would like to add that I answered that question, I believe when asked, with reference to some examination concerning ore-beds in this neighborhood. I was asked if I noticed the dip at that particular point. I said that I attached no importance to it. It would, of course, be important for a surveyor to have it down, and might have been important for me. But having seen so many thousand feet of this quartzite,

knowing its general dip, I did not care what that dip was at any particular and isolated point. I was satisfied as to its general course. I do now remember, though, the dip at the quartzite at that particular point. I think Mr. Wren asked me about its course;
424 if it was the dip that he asked me in reference to, I have a note on the subject in my book, which I remember, and it has just come to my mind.

[Here the court adjourned till 10 A. M. to-morrow.]

425 FIFTH DAY.

July 27th, 1877.

Re-direct examination of R. W. RAYMOND—Continued.

Mr. Thornton.—Q. Speaking of the identity of that clay shale of the northern boundary, how much of that have you ever seen, at the different places? To what extent, in all?

A. On a rough calculation, 5,139 square feet of area, on the tip of it, which extends in the aggregate, adding together the height of the different exposures, 152 feet in depth, and the aggregate extent of exposure is 871 feet.

Q. What are the opinions which you have given, founded upon the theories as to the filling or formation of this limestone with ore, or are they based upon the facts?

A. My opinion that this zone of limestone which I have described on Ruby Hill, is practically a single vein, is not based upon any theory of the geological history or deposition of the ore in it; but it is based upon the slope, boundaries, and the facts as observed by me as to the distribution of ore; independent of the theory as to how it got there.

Testimony of LOUIS FALKENAU, called for plaintiff, sworn.

Mr. Thornton.—Q. Where do you reside?

A. In San Francisco.

Q. What is your occupation?

426 A. Assayer and chemist.

Q. How long have you been an assayer and chemist?

A. For the last 10 or 12 years.

Q. Have you any official position in this state?

A. I have; state assayer.

Q. Have you made any assays of specimens delivered to you by Mr. Keyes?

A. I have.

Q. Where did you receive these specimens?

A. At Wells, Fargo & Co's express office.

Q. In what were they contained?

A. In a box sealed at two points. The two screws were sealed

over. I took the box to my office, or had it taken to my office, and opened it and unpacked it.

Q. Did you take out the specimens?

A. They were contained in little canvass bags.

Q. How were the bags marked or prepared?

A. They were, each one, marked with pencil outside, and with a tin tag bearing the number on the outside.

Q. Who broke the seals to that box?

A. I did.

Q. How were these seals arranged upon the boxes?

A. The boxes were screwed with two screws, on the opposite ends of the box, which were countersunk, and a seal put over them.

Q. Did you see the impress upon the seals and compare it with the original?

A. I did.

Q. Could the boxes have been opened without your knowing it, or the man who had the seal knowing it, after it was sealed?

A. I should think not.

427 Q. Did you make assays of those specimens?

A. I did.

Q. Give your assays.

[Witness then read the following assays, saying that the value was computed according to the United States standard, 129.29.]

STATE ASSAY OFFICE,
SAFE DEPOSIT BUILDING, ROOM 16,
S. E. CORNER OF CALIFORNIA AND MONTGOMERY STREETS.

No. 3,683. SAN FRANCISCO, *July 26th*, 1877.

Eureka Consolidated Mining Company, Present.

GENTLEMEN: Annexed, please find statement of assays of 57 samples of ore, marked No. 1 to No. 57, received of S. W. Keyes, Esq.

Each sample was securely tied in a sack with a tin tag bearing the number enclosed; all the samples were contained in a box sealed in two places, with the seals intact.

Yours, truly,
(Signed) FALKENAU & REESE.

No.	Ozs. of Silver per Ton.	Value.	Ozs. Gold per Ton.	Value.	Lead, per cent.
1	30 25/100	$39 11/100	0 121/1000	$2 51/100	25
2	1 94/100	2 51/100	0 486/1000	10 4/100	No lead.
3	1 57/100	2 4/100	0 182/1000	3 76/100	No lead.
4	1 70/100	2 19/100	Traces.		No lead.
5	35 47/100	45 86/100	2 186/1000	45 18/100	72⅔
6	11 78/100	15 23/100	0 364/1000	7 52/100	11⅔
7	12 2/100	15 54/100	0 121/1000	2 51/100	2⅓

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No.	Ozs. of Silver per Ton.	Value.	Ozs. Gold per Ton.	Value.	Lead, per cent.
8	17 98/100	25 24/100	1 458/1000	30 13/100	20
9	32 80/100	42 41/100	2 430/1000	50 23/100	62⅔
10	145 80/100	188 50/100	0 60/1000	1 25/100	61⅔
11	57 34/100	74 13/100	1 579/1000	32 64/100	74⅓
12	54 43/100	70 37/100	3 888/1000	80 37/100	72⅔
13	8 50/100	10 98/100	4 252/1000	87 89/100	72
14	160 25/100	207 18/100	0 121/1000	2 51/100	53⅓
15	132 19/100	170 90/100	0 242/1000	5 2/100	50
16	117 61/100	152 2/100	0 242/1000	5 2/100	47⅓
17	26 11/100	33 76/100	6 682/1000	138 12/100	73⅔
18	4 73/100	6 12/100	1 339/1000	27 61/100	31⅓
19	53 21/100	68 79/100	0 303/1000	6 27/100	53⅓
20	3 52/100	4 55/100	0 425/1000	8 78/100	No lead.
21	5 22/100	6 75/100	0 243/1000	5 2/100	23⅓
22	2 30/100	2 98/100	0 121/1000	2 50/100	3⅓
23	6 7/100	7 85/100	0 607/1000	12 54/100	15
24	66 58/100	86 7/100	0 243/1000	5 2/100	58⅓
25	5 10/100	6 59/100	0 364/1000	7 52/100	10⅔
26	10 69/100	13 82/100	0 243/1000	5 2/100	33⅓
27	2 43/100	3 14/100	Traces.		1⅔
28	2 43/100	3 14/100	0 60/1000	1 25/100	2
29	92 21/100	119 20/100	0 121/1000	2 51/100	53⅓
30	100 48/100	129 88/100	0 121/1000	2 51/100	51⅔
31	330 48/100	427 26/100	0 60/1000	1 25/100	63⅓
32	316 98/100	409 83/100	0 121/1000	2 51/100	56⅔
33	37 66/100	48 69/100	0 60/1000	1 25/100	16⅔
34	247 61/100	320 13/100	2 673/1000	55 25/100	63⅓
35	200 47/100	259 17/100	0 60/1000	1 25/100	25
36	3 3/100	3 92/100	0 60/1000	1 25/100	5
37	6 56/100	8 48/100	0 121/1000	2 51/100	No lead.
38	4 25/100	5 49/100	Traces.		2
39	1 82/100	2 35/100	Traces.		None.
40	2 43/100	3 14/100	Traces.		None.
41	3 3/100	3 92/100	Traces.		None.
42	1 94/100	2 51/100	0 121/1000	2 51/100	None.
43	4 61/100	5 96/100	0 242/1000	5 2/100	None.
44	1 82/100	2 35/100	0 60/1000	1 25/100	None.

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45	11 29/100	14 60/100	0 850/1000	17 57/100	1
46	2 43/100	3 14/100	Traces.		2
47	2 30/100	2 98/100	0 182/1000	3 76/100	2⅓
48	2 6/100	2 67/100	0 60/1000	1 25/100	None.
49	2 43/100	3 14/100	Traces.		1⅓

No.	Ozs. of Silver per Ton.	Value.	Ozs. Gold per Ton.	Value.	Lead, per cent.
50	$1\frac{94}{100}$	$2\frac{50}{100}$	$0\frac{60}{1000}$	$1\frac{25}{100}$	None.
51	Traces.		Traces.		None.
52	$2\frac{91}{100}$	$3\frac{77}{100}$	Traces.		$3\frac{1}{3}$
53	$2\frac{43}{100}$	$3\frac{14}{100}$	Traces.		2
54	$2\frac{55}{100}$	$3\frac{29}{100}$	Traces.		None.
55	$2\frac{6}{100}$	$2\frac{67}{100}$	$0\frac{60}{1000}$	$1\frac{25}{100}$	1
56	$2\frac{55}{100}$	$3\frac{29}{100}$	$0\frac{121}{1000}$	$2\frac{51}{100}$	2
57	$4\frac{13}{100}$	$5\frac{34}{100}$	$0\frac{182}{1000}$	$3\frac{76}{100}$	$1\frac{1}{3}$

Q. Are those assays made by you of those specimens correct or not?

A. They are.

Q. Is that a true and correct report of the result of those assays?

A. It is.

Testimony of F. STERRY HUNT, called for plaintiff, sworn.

Mr. Thornton.—Q. Where do you reside?

A. Boston, Mass.

Q. What is your occupation?

A. I am geologist, chemist, and mineralogist; professor of geology at present.

Q. Of what school?

A. Massachusetts Institute of Technology.

Q. How long have you filled that position?

A. Five years.

430 Q. Where did you derive a knowledge of your profession?

A. My early studies were made at Yale College, and I subsequently was for twenty-five years connected with the geological survey of Canada, and during twenty-five years, in the discharge of my duty in various parts of the Dominion of Canada during that time, and, subsequently, at a great many points in the British Provinces, and in the United States, east of the Mississippi.

Q. Have you ever examined the "K. K.," "Eureka," and Richmond mines, on Ruby Hill, Eureka county, Nevada?

A. I have.

Q. When?

A. On the 18th, 19th, and 20th days of this present month of July.

Q. Will you state to the court the characteristics of those mines, and your opinion as to whether they are upon one and the same lode?

A. I will endeavor to do so. To commence with, I will give briefly an account of the way in which I made my examination, and the way in which those three days were occupied. I began upon the outcrop, followed the outcrop of the quartzite, observed the various outcrops of ore along as far as the base of the Richmond across

the hill, examined tunnels, and made my way along over the Eureka, K. K., and the Phœnix and the Jackson, seeing the superficial outcrops. Beyond the Jackson I followed with my eye, and for a little distance on foot, sundry outcrops, which showed a further continuation of the rocks which I had seen. I then spent two days and a half in different examinations in certain levels of the K. K., of the Jackson, of the Eureka, and of the Richmond.

431 I may proceed, perhaps, to describe in general terms my conclusions with regard to nature and the geological structure of the region in question, which is very simple.

I observed in the first place a great mass of quartzite, which appears to be underlying rock. I saw nothing lower than quartzite. An outcrop of that quartzite, and its overlying strata, is traced in a nearly east and west line from the Richmond along through the Eureka and the K. K. and the Phœnix, until I found it there turning to the southward, while at the western extremity of the Richmond I found it and its overlying rocks turning to the northward. But my conclusion from that, and from the general knowledge which I had of the geological structure of that region, is this: that we have there the meeting, as it were, of two lines of elevation, two anticlinals, the general run of these anticlinals in this region being north and south. But, as is generally the case, one anticlinal dies out and another takes its place. The western anticlinal would run north from the Richmond, and the one to the eastward would run south from the Jackson. And as always, where you have a passage, as it were, from one of these anticlinal folds to another, you have necessarily a turn or strata, bringing them around from an easterly dip, which they have in the Jackson, and further southward and around a curve until they take a northward dip. And then to the westward, turning again, so that they begin to have an eastern dip once more.

The result of such a series of movements is one to which I beg to draw the attention of the court. It is this: wherever you have such folds and such turns in the stratification, you are apt to have a very considerable amount of local disturbance of the strata; which

432 result to a greater or less extent in the crushing, or crunching, so to speak, of a greater or less portion of such a strata at such a point.

I might be pardoned for illustrating it by referring to what we see in various coal mines; where you see, between the hard rock on one hand and the soft rock on the other, a coarse mass of strata, crushed, crumpled, and broken, as it were, into fragments; and not only so, but displaced so that they are squeezed out in great masses, in one body, or bunched up into a very narrow form in others, forming what are called rolls; and again pinchers. So that the normal thickness of a vein of coal would be vastly augmented in one place and would be very much compressed, and almost effaced at another point near by. That structure is, as far as I can judge,

the structure which we have to deal with in the present case. And where we have this condition of things, as in the case of a clay bed, it is because the rock has been broken by the force of the great earth movements which have produced these false bodies in the strata; and because there has been a harder rock and a softer rock.

There is another point in this connection which I wish to allude to. Where you have a softer overlying rock like a fire clay in a coal seam, like in sand or shale rock, there is a surface, under which and alongside of which the crushed mass is incapable of slipping. And then you will often have the crushing of a seam of that kind while the rocks in the immediate vicinity of it escaped that crushing. You will have necessarily the sand or shale bed, like a bed of coal which is crushed. You will have it thickening and thinning, giving bulges and pinches, like the crushed mass of rock in question.

433 Now, with regard to this crushed mass, it does not necessarily follow that the whole of this mass is crushed alike or equally. In fact, as the court will understand, from such irregular pressure as must be exerted in the crumbling of these rocks, some parts will be crushed into very fine fragments, and others will be much less crushed. Or it may even happen that in portions of the zone considerable blocks escape crushing altogether. Again, the position of the bed of shale which may lie above it, as in this case, or beneath it, as in the case of a coal seam, may be such that a portion of the rock outside may be involved in the same crushing process. So that this expression, "crushing," may not be an absolute one, and does not necessarily involve every particle of the rock within the mass; but may extend to the ouside of it. That will be apparent when we consider that the question of crushing is a question of breaking into larger and smaller fragments. One mass of the rock may be broken into fragments no larger than peas, and another mass may be so many feet in diameter that it will at first be taken for a mass of uncrushed rock.

Now, to return to the question of this particular deposit, I wish to say that, overlying this mass of quartzite, we have a gray bed of crushed dolomite or magnesian limestone. I prefer to use the term dolomite, because, so far as I am aware, it approaches more closely to dolomite proper. We use the term "magnesian limestone," in a vague sort of way. In scientific strictures, a dolomite is a definite compound of about 46 parts of carbonate of magnesia, and 54 parts of carbonate of lime; but it very often happens that in our limestone we have mechanical mixtures of this dolomite,

434 with a greater or less amount of carbonate of lime; mechanically intermixed, so that the term dolomite is not proper, as applied to the mass as a whole. Hence it is that geologists, to avoid ambiguity or perplexity, in speaking of a mixture of dolomite and carbonate of lime, called these rocks magnesian lime-

stone. I make that explanation because the question has come up as to the difference between dolomite and magnesian limestone.

This bed of dolomite or magnesian limestone is very much crushed and crumpled.

Above that I observed in the various localities a seam of what might be called shale or clay. Now, this term itself is an ambiguous one. "Shale" refers rather to structure, and clay represents the chemical composition. Our truest shales are little more or less than consolidated clay. But we occasionally apply the word shale to thin bedded rocks, and thin rocks which break like shale or slate. What I can say about this rock is, that it has not the rigidity of the limestone. It has a different tenacity, and is capable, more or less, of being bent or scratched with the nail. It has a sort of softness which distinguishes it from the limestone and from the dolomite or magnesian limestone.

Above, or outside of this belt of clay—I say above, because these rocks are tipping at an angle from perhaps 45 degrees with the horizon, subject to very considerable local variations. Overlying this immense mass of limestone and overhanging clay seam, is another great mass of magnesian limestone, which, as I saw it in the various openings and outcroppings at the surface, is a comparatively a thin bedded limestone, magnesian limestone, or dolomite, I judge, like the underlying rock, and having more or less intercalated layers of clay or yellow matter which I did not observe fully, principally a mass of shale, in that crushed zone.

435 So far as I can judge, there was originally little or no difference between the limestone above and the limestone below. That is to say, the limestone in this crushed zone beneath seems to be made up of just such fragments as would result from this crumbling or crushing in that I have spoken of between polished rolls; and the thin limestone beds which I found overlying the crushed mass.

So far, I have endeavored to bring before your minds a notion of a layer of quartzite having above it a layer of variable thickness of this crushed limestone, and above it a layer of shale, which seems continuous, but thickening and thinning, and above that a mass of stratified limestone. Now, as to thickness of this crushed mass of material. It seems on an average to be about 200 or 250 feet in one place; perhaps, and something like 40 feet, and in another place perhaps and 10 feet in another place; so that the crushing seems to have brought together the foot wall and the hanging wall; and the overlying shale and the underlying quartzite are brought within less than an inch of each other. Whereas, further to the northwest this has a great roll, in which there is a very much greater thickening of the mass of limestone, exceeding 200 or 250 feet.

Now, as to the intimate characteristics of this crushed mass of material. As I saw it outside, I saw it especially as it is well seen on the Richmond and the Eureka. On the southern side of the hill,

immediately above the quartzite, I find that it is broken masses of limestone, which are re-cemented together by matter which has subsequently been infiltrated. In some cases I find the infiltrated matter to be iron oxides apparently. But in the far greater number of cases, in fact the general rule throughout the rock is, that the
436 cementing material is a white starry matter having the characteristic crystalline form and the aspect which belongs to pure carbonate of lime. Sometimes the cementing is so strong that there are great masses of these angular fragments bound together and apparently as strong as the original rock. At other times the cement is very loose, and the matter is almost crumbling, the particles seeming hardly bound together.

So much, then, for the character of this enclosed mass of rock.

Further, I wish to state what other matters I find in this mass of rock, what seams and ore-masses or impregnations of ore. And I will say that I find a long outcropping of this mass is broken limestone, various openings of ore-bodies—that is to say, spaces irregular in form, in the rock, from which ore had been removed. When I came to follow that underneath the rock, I found a clearly continuous belt of great distance along the dip, inclining or lying upon a thick wall of what I call ore.

I should define what I mean by ore in this case. The court is aware that the material which is mined in this deposit is mined for the precious metals which it contains; that you have in these masses all ore-bodies without naming them further at present—a rusty earth-like mass consisting in large quantity of the oxide of iron, such oxide of iron being apparently the predominant material, except so far as it is mixed with crumbling rock; that that oxide bounds the carbonates of lead and small quantities of zinc, and, incidentally, silver is found in the deposit. I say nothing of arsenic and other impurities are present. This material sometimes has a great predominance of lead in it. Sometimes the iron existing prevails over the lead part of the material, and so colors the other materials present that you can only distinguish it as a coarse-
437 like form or iron mass of material. Wherever you find this material in a vein, I take it as ore and regard it as such.

As I stated before, this mass of ore or orey matter not only extends for a long distance along the quartzite wall above, horizontally, and on the slope of quartzite, but is found in various other parts throughout this broken mass of limestone. Irregular masses and caverns are found in the mass of limestone, opening upwards and downwards, and running in different directions; irregular spaces or cavities or channels filled with ore; sometimes cavities of very large size; sometimes cavities of very small size, forming what are called geodes and bugs, and irregular cavities filled with this material. The material, as it is found in these masses, is generally in layers stratiform. Sometimes these layers are nearly horizontal, as upon the quartzite wall; where there is a gentle wall you will find the ore lying in

almost horizontal sheets, having all of the marks of stratification, and varying in quality; the lower layers in some cases, where I saw them, at least in one case, being distinct carbonate of lead ore, overlaid by sandy layers and overlaid by clay layers; the whole forming a stratified mass of nearly horizontal clay.

At other times I found in these cavities, and wherever it is cut through there you may look above and see the spaces, and you will find these layers of ore a little different in color, ranged in consecutive layers. These differences of color in the layers and cavities of the layers are sometimes caused by the crystals of the salts of lead, showing thus, by visible signs, the presence of lead, which, in much of the granular ore, cannot be detected. You find, also, in these cavities crystals of crystalline carbonate of lime incrusting them, and sometimes they will make a very beauti-
438 ful appearance. At other times these caverns are to a very great extent empty. There are places which I was credibly informed have the appearance of having been empty from the time they were struck in the drift. At other times you have opened places which have been left open by the operation of the miner taking out from them the ore which they contained. Another point is this: that occasionally in these masses of ore, sometimes in the larger and sometimes in the smaller masses, you find other ores, ores which are sulphurets and oxided ores, mostly of galena. I saw crystallized galena in masses of several hundred pounds in weight. I also saw masses of lead, and in one case my companion brought to me from a mine I did not visit masses of sulphate of iron ore. So we can say that the ore-mass contains in certain parts of it the unoxidized sulphurets of lead, of zinc, and iron.

Now, when I have described this irregular mode of distribution, this belt along the foot wall, its irregular fistulas or channels or caverns opening in some cases, and visibly making their connection with one another, and with a foot wall, in other cases little chambers in which the possible connection with a great part of the wall along the foot wall cannot be traced. I nevertheless conclude that those little cavities in the rock must have had some channel through which the ore could enter. And, therefore, I conclude that if you should cut these cavities in a certain direction you would cut and expose the channel through which they were filled. They are these irregular cavities connecting with some little fistula through which the ore must have found its way with them. Now, with regard to the way in which the ore got there, and the nature of this ore deposit, I wish to say that the theory which I suppose will be
439 accepted by all geologists at the present day, is that ores of this kind have been brought into the rock in a state of solution, have been as such deposited there from watery solutions. This deposit belongs to a very large class of deposits which are known more or less in various parts of the world; and which, really, according to the conclusions of our best observers, constitute a class of

deposits apart from themselves, a class *sui generis*. They are the great lead-yielding deposits, yielding the larger portion of the lead of the world, and also a certain proportion of zinc; and they occur in limestone, clay, and dolomite. In almost every case they are known to occur in dolomite or this magnesian limestone; and it is not certain whether they occur in other limestone. At any rate, Mr. Von Cotta, one of our best authorities, in describing these, seems to imply that they are always in magnesian limestones; and that the magnesian limestone itself has something to do with the deposit. Thus, we have a condition of things in this peculiar class of deposits very unlike that of ore deposits in granite or sandstone, because we have in these magnesian limestones peculiar conditions of texture and condition. In other words, these limestones are very soluble in water. They have a solubility in water which does not belong to porphyry, granites, gneisses, and sandstone. It is the common experience of those who study these rocks that they are liable to be penetrated with irregular fissures and chasms. Great caves and small caves, channels and sinks are common in all limestone countries. If, now, you ask why the magnesian limestone is more apt to be thus affected, I answer that it is because limestone, as a general and almost universal thing, is more porous, and when waters coming up from below, or down from above, enter into a strata, and pass over the outcrops of strata, then the magnesian limestones, being porous, allow the waters to pass into them, and, once a channel established, the solvent action of the water takes away the limestone, makes the channel wider, brings in more water, and at last cuts them out and slopes them into great chasms or cavities. Hence you have an irregularity in these which does not apply to any other vein, where we find simple breaks produced by mechanical agencies. These are irregular channels. The water following along in its course goes to the floor of the quartzite, meets this insoluble rock, cuts its irregular channel through, and goes on burrowing in various ways, every little eddy or local condition of things sends it off into irregular channels, fistulas, sinuses, caverns, and hollow places, large and small, down to little pores, great channels and little channels, until the whole mass is permeated in an extremely irregular manner. Thus you have in this mass of magnesian limestone, even supposing that magnesian limestone has not been the subject of the previous crushing agency, a set of very irregular cavities such as can very well be seen in the lead-bearing magnesian limestone of the Mississippi valley. I do not compare this with that, except so far as to show that they are both examples of lead and lead ores in magnesian limestone. There the deposits are horizontal. Here there is no such crushing force as I have described as intervening to produce this broken, crushed, and singularly disturbed mass which we have on Ruby Hill. But in both cases the action of the water has been similar. It may be said that this irregular crushing, perhaps, prepares the way for and favors the

subsequent erosion, cutting away, and solution of the rock, and thus prepares it to receive the ore.

Then arise the two questions: where did the ore come
441 from with these channels; and, when did it come in there?

The conclusion which these analogous deposits leave, in my mind, is this: that the irregular cavities were made not simultaneously with the deposits of the ore, but anterior to it. That there might have been, however, at the same time the ore was being deposited, waters which were flowing out and enlarging these channels, and preparing other receptacles for the ore, is extremely probable. This ore comes up with waters from below, to a very great depth. Perhaps, if we could penetrate thousands of feet downward, we might find veins and fissures passing in the lower rocks through which percolates the water that brought the zinc and precious metals, and filled the cavities of this limestone. That this deposit comes up from below is very clear to me, because and on account of the original unoxidized condition or those ores that you have in the lower level of that mine, great masses of unoxidized sulphuret of iron, with some other metallic sulphurets. You have also, in various places there, irregular masses of lead and galena; just such crystals of lead and galena as you find ordinarily in mines holding the unoxidized ores.

Then I conclude that those cavities and chasms were filled with those unoxidized ores; but at a comparatively early period there must then have followed another condition of things; because these ores are to-day oxidized. Waters that have come up from below are not oxodizing waters. If they were oxidizing waters, they could not deposit these sulphurets; but we know, in the case of a vast number of these waters that come up from deposits, that, instead of being oxidizing, they are sulphurizing waters, actually containing sulphur and metallic salts in solution. But it is the surface waters which
produce oxidation. We have all seen, and I have examined
442 many deposits of that kind, especially in parts of the southeastern states, in the Blue Ridge, where great masses of ore have been found in the depths, completely unoxidized, and sulphurets of the metals, lead, zinc, iron, and copper are there. As you go further up in that vein you find that all of the sulphurets have been converted into oxides. Some metals dissolve in it, and the sulphur having disappeared, and other of the metals accumulating in irregular cavities and fissures, and masses scattered through masses of iron ore, very like the iron ore that we find in the Ruby Hill mine, carrying the precious metals.

The processes are even more complicated still, in a vast number of cases, for these metals dissolve, and oxidized in the upper part, will filter downwards and accumulate in lower levels in great masses, and sometimes in the interstices they are reconverted into sulphurets. The famous Dogtown mines in East Tennessee are examples of this, where the sparsely disseminated copper through the upper

part of the lode, having been oxidized, has gone down, and has accumulated in certain layers and masses below, retaining still its oxidized form, and in certain other masses by infiltration and chemical action have been reconverted into sulphurets. Thus we would have great concentration of rich masses of ore in this level, and richer than existed in a vein as a whole.

As an illustration of this idea, it is probable that if we could go down far enough we should reach, even in this deposit, the unoxidized ores; how far we must go I will not pretend to say; because, as the mass of magnesian limestone is so much more porus than most other rocks, that the infiltrating surface-waters will find their way to very much greater depths there than in others, and different classes of rock deposit.

443 I, therefore, conclude, from the condition of things as I have seen it in this mine, that at a late period after this region was raised so that it was a mountain range, so that it would receive upon the surface waters from heaven, which worked their way downward through this mass; that this process of oxidation went on converting the sulphurets of lead and the sulphurets of iron and of zinc into their oxides; redeposited them in the lower levels; redeposited them often in their concentrated forms, as I have observed in the striated form, or layer-like arrangement. There are great caverns now in that mine, having in the lower parts this stratified material, and having variations in the quality of the ore, and the whole showing a dissolving and filtering down as I have described. Various similar processes have been traced and described with great detail in the lead deposits of Missouri, especially in the late geological report of southeastern Missouri, where it can be shown that those sulphates have been dissolved and converted into carbonates, and the sulphur has been carried farther in that solution and elsewhere deposited in crystals. This process was not a complete one in the Ruby Hill, because we have here and there portions of the masses of ore incrusted with the remains of their oxidation, and we have some nucleus masses of the unoxidized sulphurets remaining as evidence of what this deposit-ore was.

I have said sufficient to explain to the court my idea of the actions which have taken place in this ore-deposit. The formation of the limestone, the excavation of it by infiltration, the waters coming up from below and cutting out their channels and cavities in the mass; simultaneously with that, or succeeding it, very likely

444 acting simultaneously, you have the deposit of the sulphuret ores. Afterwards, the surface waters charged with carbonic acid and with oxygen, as our superficial waters are, have infiltrated their way downwards and have oxidized these ores, leaving them sometimes in their places, or transporting portions of them and depositing them in the fissures and cavities or in comparatively horizontal places where favorable conditions for deposit are afforded.

Now, with regard to the distribution of this ore through this mass of rock, and the question as to what is to be considered a vein, or a ledge, or a lode. My conclusion is this: that this whole mass of rock is impregnated with ore; that although the great mass of ore stretches for a long distance above horizontally and along an incline down the foot wall, as I have traced it, from this deposit you can also trace the ore into a succession of great cavities or bonanzas lying irregularly across the limestone, and into smaller caverns or chasms of the same sort; and that the whole mass of the limestone is irregularly impregnated with ore. I use the word impregnation in the sense that it has penetrated here and there; here little patches and stains, ore-bugs and caverns, and spaces of all sizes and all shapes irregularly disseminated through the mass. So far as I am aware, these deposits of ore do not extend into the underlying foot wall, and do not extend into the regularly stratified and uncrushed limestone above. I should not be at all surprised that they did, to a limited extent. It would be almost contrary to the nature of things that the crushing had been so complete that there should not be cracks or fissures, and a streaking of the quartzite in each case. You may find that. And there might be little cracks outside of the shale in which these ores might have been deposited. I have
446 never seen that, or heard of any such deposits; but it would be quite in accordance in what we see in veins and lodes in other parts of the world. I conclude, therefore, that this great mass of ore is, in the proper sense of the word, a great lode, or a great bay in the sense in which the word is used by miners; and that practically the only way of utilizing this deposit is to treat the whole of it as one great ore-bearing lode or mass of rock. If you were to follow carefully the tracing, you would find one of these masses which even now may seem detached in a mass, lying away from the foot wall, and you will find it, tracing it down to the mass of ore which lies along the foot wall, because this mass of ore lying along the foot wall becomes, in various parts, the only representative of the material lying between the shale and the quartzite. It is a crushed mass of limestone; it is a vein, it is an ore. In these places the whole mass of this crushed limestone, pinched out to a comparatively small thickness, has disappeared, and only ore occupies its place. No one who would look at it in that narrow place but what would say, here is a vein between the quartzite below and the shale above. And when you trace it upward it thickens several feet, and is still ore. When, afterward, you traced this mass, you find going into it irregularly a quantity of this broken limestone, the great mass of ore cropping on the foot wall, but a bulging mass of limestone irregularly penetrating the channels and bugs of ore, and finally, where it thickens and becomes very wide, still irregular masses coming from the foot wall and occupying the whole breadth between the foot and the hanging wall, making it practically one great ore-bearing mass or lode. Therefore, I repeat that it seems

to me, whether we look at the position of this ore in the rock; whether we look at the theory of its origin, or whether we
447 look at the conditions which present themselves to the practical miner, who must regard this great mass of crushed limestone with layers, and its masses of ore, as one great ore-bearing mass of material, as a unit, to be considered as one great lode or ledge of ore-bearing matter.

Q. Did you go in the Eureka works to the ore-body at the west end of the fifth level?

A. Yes, sir; I did.

Q. Did you go to the ore-body at the west end of the Eureka ninth level?

A. I did.

Q. Did you pass up from the ninth level ore-body to the fifth level ore-body, of which we have spoken?

A. I did.

Q. Through what works did you pass; how did you get up there; and what did you observe?

A. I came up along certain openings along the quartzite wall, climbing up by ladders along the quartzite; I saw all of the way along masses of ore. I have a brief statement of that, in which I give it in perhaps better language. Thence passing to the K. K. shaft, where in the 3d level, 284′ from this depth, by an oblique course, I reached the hanging wall of the shale, overlying a considerable mass of dark-colored ore which had been followed 35 feet by an inclined winze against the hanging wall. This hanging wall was followed 185 feet, and was a regular bed of shale, which in one place was penetrated 35 feet, and dipped with a high angle to the northeast. From the east end of this hanging wall we crossed by irregular courses south to the foot wall of quartzite by a course of 320′ distance between the two walls, as measured on Westcoat's map 280′. The whole distance in low-grade ore. A drift
448 was then followed 200′ or more northwest, all in low-grade or orey matter, to the wall of quartzite occupying the middle of the vein, and surrounded more or less completely by masses of ore.

In the Eureka shaft I went to the 9th level. 730′ from surface. The 7th, 8th, and 9th levels pass into the foot wall which is here vitreous quartzite. From this depth a cross-cut, 68 feet north, enters the lode and is carried 150 feet north to the hanging wall, but from an inflow of water I was prevented from reaching it. About 110 feet from quartzite, a drift from the cross-cut is carried north 64° west, nearly the strike of the vein as seen in the higher level; 80 feet farther another cross-cut goes northeast to hanging wall, but fails to reach it on account of water, but 90′ southward strikes foot wall of quartzite, which here carries a little seam of ore. Here is encountered a great bulge in the quartzite which projects horizontally into the vein about 175′ at right angles to the normal course of foot wall, and is traversed by a west drift, thickness about 250′.

West of the quartzite bulge is another cross-cut from the drift extending 250′ northward, although in low-grade ore or orey ground, except a barren space of 20 followed by a thin seam near the hanging wall.

.70 feet west of last cross-cut in 9th level is another cross-cut south to quartzite 120′. I did not visit the quartzite, but the 30′ next the drift is ore in bugs, and shows overhead a small natural cavern. This drift, going west, passes through barren rock, with numerous bugs of ore, for 240 feet, where a cross-cut 30′ south leads to the bottom of a winze, which ascends on the quartzite into the cave between the 8th and 9th levels, which was a natural cave, holding ore near the bottom.

449 On the quartzite at this point was a layer of 20″ of ore, very rich in lead carbonate. Continuing westward 200′ from the last cross course to the winze just mentioned, a total distance of about 1,000° west of Eureka shaft, we reach the Richmond workings by going down a winze of 30′ leading along the quartzite, whence a zig-zag line leads into the Potts chamber.

The whole of this distance, from the ore-body of the Eureka on the 9th level to the Potts chamber, was traced by a seam of ore or by stoped ground matter, having the aspect of ore and said to carry ——, the ores traced from the quartzite through the stopes in the Richmond workings, including the Potts chamber, to the overhanging shale.

In the Eureka, ascended by the winze already mentioned, into the cave between the 8th and 9th levels, a widening chamber 40′ high; from this, by ladder, to 8th level, following ore all of the way; and then, on the 7th level, still climbing up the foot wall of quartzite, a seam of ore, sometimes 6″ and sometimes several feet thicker. From 7th level I passed west a few yards. Thence with ore everywhere on the quartzite wall, here very steep in places to 3d level, where very rich carbonate ore was seen covered by laminated clay and sand. Returned along the quartzite by the 5th level to the shaft, a continuous ore stain marking the contact, besides a large cavern and numerous small ore-geodes at short intervals in the 5th level.

This vein was traced from 5th level above to 9th level, and then about 1,000′ along the quartzite into the Richmond workings, in which, by connected ore deposits or stoped ground, it is traced to the hanging wall.

Cross-examination of F. STERRY HUNT:

Mr. Wren.—Q. What is your theory about the formation of the rock on Ruby Hill and the hill adjacent?

450 A. That question goes back to a very early day. Do you mean the theory of the formation of the quartzite and the dolomite? The rocks have undoubtedly all been deposited from water; they are of aqueous origin; farther, as regards the source

of the silica which in a crystallized form makes the quartzite, and as regards the source of the dolomite or magnesian carbonate of lime which has been deposited from water, and is the result of chemical action, I can go at length into that question.

Q. I do not wish you to go at length into that or any question; the rocks are of sedimentary origin, are they?

A. Undoubtedly.

Q. Laid down originally horizontally.

A. Yes, sir.

Q. Beneath the bed of the ocean?

A. Beneath the bed of the ocean, or a bed of water.

Q. They were subsequently raised to their present position?

A. Undoubtedly.

Q. Is it your opinion that the dolomite was shattered during the process of elevation?

A. So I conceive. I know of no other force that has shattered it. Such a transition and unfolding from one stripe to another could scarcely have been effected without such a crushing and scattering of the mass.

Q. The ore was deposited subsequently to the shattering?

A. Yes, sir.

Q. And then, at the time the rock was raised to its present elevation, the quartzite did not form the foot wall of any lode, did it?

A. That question involves a difficulty. "Raised to its
451 present elevation" is one thing, and the folding of it is another. It does not follow that at the time when these strata were fitted, they were raised over the hills of Nevada. When that crushing and folding was effected, in my opinion, these rocks were lying very much lower than at the present time, perhaps below the ocean's level. But continental elevation is something entirely distinct from what we called elevation, or the tilting up of the beds.

Q. The quartzite did not become the foot wall of the lode until after the deposition of the ore, did it?

A. It was scarcely a lode until the cavernous mass of rock had ore in it. It was the foot wall of a crushed mass of rock. The question is whether it could be called a lode until it had ore in it.

Q. Could it be a lode until there was ore in it?

A. Practically, I think a miner would not say that the crushed, loose mass of rock was a lode, unless it contained ore or something of value to be mined.

Q. Theoretically, what would a mining expert say?

A. A mining expert would say that it was a crushed mass of rock and cavern, ready to have ore deposited in it, or anything else that might come along.

Q. The quartzite, then, would not form the foot wall of the lode until the rock that rested upon it became a lode?

A. That question seems hardly to require an answer. Until it was a lode the quartzite could not form the foot wall of a lode.

Q. Then that quartzite was not a foot wall until the body of ore was deposited?

A. The quartzite had its present position. It was an underlying mass, and limited this zone or bed or layer of stratified rock. But, until you can say that that mass becomes an ore-bearing mass, and is thus entitled, in ordinary parlance, to the name of lode, it
452 could not be said to be the foot wall of the lode. A wall built by a mason cannot be said to be the limit of the room or chamber until there is a chamber enclosed on one side of it.

Q. Suppose that the shale found overlying what you call the lode was also deposited in the same mode that the limestone was deposited?

A That it was deposited through water? It had not the same chemical origin, because it is a different substance. It was, undoubtedly, a clay deposit over the layer of the magnesian limestone.

Q. And subsequently the other limestone on that?

A. Precisely.

Q. And so on, the various strata lying to the northeast of this section?

A. Until we had many thousand feet of strata, according to the measurements of Clarence King.

Q. Then the shale was not the hanging wall of any lode until after the ore was deposited?

A. Not until there was a mass of ore there; I cannot call a cavern or fissure in a mass of rock ready to receive ore, a lode, until it is really filled with ore. In miners' parlance it could not be so any more than a crack in a rock would be a fissure-vein of ore until it had been filled with ore.

Q. By what processes are the walls of the lode usually formed?

A. That is a very wide question indeed; it involves the whole question of "what is a lode?"

In the case of the contact of a mass of this kind the underlying wall is in a mass of quartzite laid bare by infiltrated waters, and that is the way that the foot wall was found. The hanging wall, where it was under the shale there, is a mass of limestone cut out
453 by erosion, and that makes the hanging wall of that lode. In other cases it may be a transverse crack through porphyry or granite, or whatever else may be in the rock.

Q. The walls of the lode are usually formed, are they not, by the fissuring across of the roof?

A. They are in certain rocks, but not in the case of this magnesium limestone, which I have stated forms a class sui generis. Its peculiarity is due to the fact that you have the porous and soluble rock there, and the channels are formed by percolating waters. In rocks like granites, porphyries, and mica slates, we have a great

many ores and ore deposits and veins, in great breaks and fissures in the course of the roof.

Q. Why may not fissures be found as well in dolomitic limestone as any other kind of limestone?

A. There is no impossibility, perhaps, why they should not be formed, but there is this improbability: the dolomite is a very soft, crumbling, and easily yielding rock. In the second place they are not here in this place. I have seen fissures through dolomitic rocks, but if dolomitic rocks are not stratified with quartzites and slates, there is no intestine improbability of a great fissure breaking right through the dolomites and the rocks above and below it, and of such we have instances.

Q. Are not fissures found in this zone of rock which you have testified to?

A. Fissures, or cracks, undoubtedly are found in this, but not fissures corresponding to the idea of fissures in which true fissure-lodes occur.

Q. In what portion of the Richmond mine were you?

A. I was in the 7th and 8th levels, and also in the 2d level. I went from this lower level in the Eureka, as described.

455 Q. Confine yourself to the Eureka and Richmond.

A. I went from the lower level in the Eureka, and passed into the Richmond workings down through the Potts chamber and into the overhanging shale of the wall. Subsequently, going down the Richmond shaft, I visited the 7th and 8th levels in that mine; I also visited the 2d level at the same time.

Q. Did you find any well-formed fissures in the Richmond mine?

A. I found certain clefts in the rock, but I found no fissures corresponding to my idea of fissures, cutting at once through that rock and through the underlying quartzite or through the overlying shale. I saw no more cases than one of the little cracks and fissure-planes, which I took occasion to follow to a considerable distance, until I approached a hanging wall or shale, and then I found the hanging wall or shale going along quite undisturbed by the fissure. The fissure seemed to be caused simply by a little sliding or dislocation of the included mass of rock between the shale. The movement was so little that it had not even affected the shale which had overlapped it. These are planes of dislocation, if you will, but I cannot call them fissures. More than that, I saw another one of those fissures which was pointed out to me in the Richmond, but it was really a fissure in the ore. I found a crack in the wall, but when I looked into it I found it was ore on the other side. It was a fissure which seemed to have been produced after the mass of ore had been deposited, or, if not, the ore had gone on being deposited on the two sides of the fissure, without any reference at all to the fissure.

Q. I understood you to say that it was a very common thing to find ore penetrating either wall of the lode?

456 A. Certainly I did; and therefore I say I should not be surprised if you could show me a mass of wall in the quartzite, or even in the shales, or on the outside of the shale.

Q. Why, then, did you conclude from the fact that you found a little bed of ore in this apparent wall in the Richmond, that that is not a wall?

A. Because it had a surface that had to me the appearance of having been a fissure made in the mass of ore. It was not a fissure which has predetermined the deposition of the ore along it, but it was a plane or dislocation through a mass of ore previously formed.

Q. Why did you think that it had been fissured through a mass of ore previously formed?

A. Because I found smooth and rough surfaces along that fissure, and I found ore on both sides of it.

Q. You can find that in every fissure, can you not?

A. You find that along the wall of the fissure. But another thing is that these very fissures are intestine movements; they are movements which do not belong to the country as a rule. Where I traced the well-developed fissure-planes of the hanging wall, I found that the hanging wall of slate passes by it without any reference to it, except the cutting; instead of cutting, as it would have done if it had been a proper fissure cut through the country rock, I found that it had slipped over the slate.

Q. At what point in the Richmond mine did you find the fissure extending in the slate or shale?

A. I did not say I found it in the Richmond mine; I think this is in the Jackson or K. K.

Q. How would the fact that you found such fissure in the Jackson and K. K., bear upon the character of the fissure in the Richmond?

457 A. Because the whole mass is so nearly united, having same conditions of rock and ore, that I should think it impossible to suppose different conditions in the same great mass.

Q. The same conditions exist for miles all over that district, don't they? I presume that so far as you have a belt of crushed limestone of that kind, you have ore in it?

A. I can't speak from personal examination, as I have already told you. I have examined this little extension from the Jackson to the Richmond inclusive.

Q. You do find in the Richmond walls that have the appearance of the wall of a fissure, do you not?

A. I scarcely know what you mean by the walls of a fissure. I find joined planes undoubtedly.

Q. Joined planes with smooth surfaces?

A. Yes, sir; but when I find a true fissure-vein, I expect to find upon the surface of such a layer an incrustation of ore upon the one end and a mass of country rock upon the other, which I do not find in the present case. Besides, I found these fissure-planes had

not any regularity. I attempted to follow these and found them dipping in all ways, and found there was no regularity at all about them, so far as my observation goes.

Q. Suppose ore is found in a limestone that lies immediately below what you call shale, would that alter your views in regard to the shale being the boundary of the lode or not, above the shale and to the northeast of the shale, above the shale topographically speaking?

A. As far as that is concerned, I say that if such a mass of rock should be found outside of that, it would be nothing extraordinary,
458 because the very conditions of such a crushing mass are such as often throw outside of the great mass of this ground, little bodies of ore. Outside of such great mass of magnesian limestone impregnated with ore, we have irregular cavities extending for some distance into the adjacent rock, carrying masses of ore. Therefore such a fact does not at all affect the theory which I have formed with regard to this deposition.

Q. Whether the rock enclosing the ore is not the walls of the ore-body?

A. To say that a rock which encloses the ore is the wall of the ore seems to be almost a self-evident proposition.

Q. I want your opinion in regard to it.

A. I scarcely understand what you mean. Will you please repeat the question?

Q. Does not the ore enclosing a deposit of ore form the walls of that deposit?

A. Most undoubtedly it does.

Q. Wouldn't the quartzite and the shale in that case be the walls of the ore wherever the ore was bounded by those two rocks, and the limestone as well, wherever it was bounded by it?

A. Not necessarily, because the mass of limestone included between the quartzite and shale has a character of its own—a character of crushed and broken material—and everywhere through that limestone zone you have the condition of things which may lead you at any time to expect a greater or less mass of ore.

Q. In every district in which the lode is found you may expect also to find other lodes, may you not?

A. As a general thing ore-lodes go together; that is to say, in the country where you have some lodes you may have a great many sets of them together, but in a case of this kind, where you have
459 one of these magnesian limestones, where there is a crushed stone of this kind, it is very improbable that you would have, in that immediate vicinity, any such lode, because the conditions which have given rise to that have been due to the fact of an underlying line of quartzite which has penetrated the fissures and given the conditions of contact-vein. It is very different where you have a great mass of porphyry fissured by great movements of the earth crust.

Q. Why should you expect to find only one fissure in dolomite and more than one in any other kind of rock?

A. I might debate upon that question. Another fact is, that it is not a fissure in dolomite, it is a water channel, a channel erosion, and it is possible that a higher bed of dolomite might be eroded in the same manner. In certain dolomites I have seen two or three floors, one after another, eroded in that way—it is possible—and that outside of your shales, one hundred or a thousand feet, may be, you may have a distinct water channel.

Q. I understood you to say that the accepted theory was that ore-deposits of this kind were filled from below by solutions carried upward in water?

A. So I did.

Q. Through what does the water come; the fissures in the rock, or how?

A. The best explanation that we can give would be this: I stated from comparative observations in other cases in similar deposits, that somewhere in the deposit you might have to go down 2,000 feet or 10,000 feet, and you would probably find a crack in the foot wall and the channel up through which the waters had come and diffused themselves through this dolomitic zone, and made with it an ore-bearing lode. I say that because I had occasion to
460 examine somewhat similar deposits in magnesian limestone elsewhere, and I have found, thousands of feet from there, in underlying granite, the channel through which the same ores had come up, so I presume if you could go down deep enough, you would find, perhaps, 10,000 feet, a channel which would be a true fissure-lode through the granite, and through which these waters come, and then found their way though this crust and simple magnesian limestone and to the surface.

Q. What are the limits of an ore of this kind, as to width? A great many hundreds of feet, or a mile or two?

A. I cannot tell what may be the width a priori, but here in this case is a special mass of limestone which I say has been crushed and eroded.

Q. You say that this zone is dolomite?

A. I do.

Q. What percentage of magnesian limestone is necessary to entitle it to the name of magnesian limestone?

A. In the first place I would say the question is what percentage of impurity you can tolerate in the limestone. Limestone, in the first place, is made of carbonate of lime, sometimes pure as in marble, and sometimes containing more or less sand or clay. When you have deducted that from the limestone the remainder is the carbonate of lime and dolomite proper contained, as an essential in the carbonate of lime, but a chemical compound of carbonate of lime and magnesia, which, in round numbers, contains in one hundred parts 54 parts of carbonate of lime and 46 parts of carbonate of

magnesia, that is pure typical dolomite. Now, that dolomite may have an admixture of clay or sand of five or ten per cent., and, in fact, most of the dolomites do contain five or ten per cent., and the very condition of composition give that, but the pure dolomite is the exception. Then the dolomite may contain, besides that mechanically present, the carbonate of lime, as is the case with a great many dolomites. If you ask me what percentage of carbonate of magnesia is necessary to constitute dolomite, you will see the question is a very complex one to make a proper dolomite, I have already answered you. How much carbonate of lime would be tolerated would be a question. I would say it is more or less dolomite, or more or less magnesian, and then you will say it is more or less clay or more or less sandy. If the carbonates predominate, you would speak of it as a limestone, more or less impure; if sand predominate, you would say it was a sandstone, more or less dolomitic.

461

Q. Then there is no limit that can be fixed between carbonate of lime and magnesian limestone?

A. It would be impossible to fix any exact limit. If practical, I suppose there would be no hesitation, because I never saw a limestone yet, and I have notably studied more limestone and dolomite than anybody else in this assembly. I never found a limestone yet that did not contain traces of magnesia. At the same time I have found a great many limestones which had their full complement of magnesia and were termed dolomite. No one will question that the rock which contains 80 or 70 per cent. of a double carbonate of lime and magnesia is entitled to the name of a magnesian limestone, though it will be stated with the qualifications more or less impure.

Q. If you found a limestone containing 10 per cent. of magnesia, and the balance carbonate of lime, what would you call it?

462

A. Magnesian limestone containing 10 per cent. of carbonate of lime, or a dolomitic limestone, if you will.

Q. Suppose it contains 5 per cent. of magnesia and the balance carbonate of lime, what would you call it?

A. Limestone somewhat magnesian. It is impossible in a mass of that kind, where you deal with mechanical mixtures, to assign any definite limit of the scientific classification.

Q. Suppose it contains one per cent. of magnesia, and that the balance of it was carbonate of lime?

A. I should say it was pretty nearly pure limestone. It is just as in water—you may have it saturated with lime, like the great Salt Lake, or the bay of San Francisco, which is fresher, or get waters so slightly brackish that a man may drink them when he is thirsty. There are waters more or less salt, and where salt water ends and fresh water begins is a matter of convenience.

Q. I understood you to say that all limestone contains some percentage of magnesia?

A. They contain traces. The very conditions under which lime-

stone has been deposited from waters, with the exception of some of the purest forms of marble, there is, probably, none that doesn't contain an appreciable trace of magnesia.

Q. What would you call limestone that contains a trace of magnesia with the carbonate of lime?

A. Limestone; because I never saw a limestone absolutely chemically pure; even our purest springs from the Sierras contain probably a little salt, and yet we call them pure water.

Q. There are names for different kinds of limestone?

A. Yes, sir.

Q. What do you call a limestone that has nearly all carbonate of lime?

A. I call it nearly pure limestone.

463 Q. Simple limestone?

A. Yes, sir; just as I call potable water nearly pure water, though I can get no pure water unless I go to the still in the laboratory.

Q. Did you say that dolomite is very brittle?

A. I did not say it was very brittle. Some dolomites are brittle and some are very tough. Neither brittleness nor toughness can be predicted of dolomites any more than they can of quartzite. Some quartzite is tough and some brittle. It is a question of mechanical accretion.

Q. What is the condition of dolomite in the zone you have been testifying about?

A. It is pretty solid dolomite.

Q. It is very tough, isn't it?

A. It is ordinarily tough; not so tough but what it has been broken and shattered into a million fragments. It was not itself compared with the force which was brought to bear upon it.

Q. It nearly all requires blasting?

A. Most rocks of that kind do require blasting. I never saw a body of dolomite yet that could be broken with a pick, except in rare cases. I have seen dolomite in the basin of Paris that could be moved by a pick.

Q. Did you say that the limestone lying immediately outside of the northeast of this belt of shale was not broken up?

A. I saw it in several cases where it was not broken up. I saw it in one case at the Utah mine or the Bell-shaft tunnel, where, outside of what was apparently the shale, there was a mass of broken limestone. Whether that mass of broken limestone, or dolomite, as I prefer to call it, was a mass which had been slid down from above, or whether it was an example of that crushing action

464 extending outside to the shale I don't know, although it seems, so far as my observation goes, in every case excepting that, to be limited to the limestone within the shale. But the condition of its formation are such that it would be remarkable if there was not somewhere outside of the shale portions of ore

crushed. The limestone within and without the same was nearly alike to the eye, and I could not tell, from the inspection of that surface, whether it belonged inside or out.

Q. Did you visit any openings on the limestone to the north of the shale?

A. I did; two or three on the hill. I saw the stratified limestone in several places on the surface.

Q. Will you please give me the places?

A. I found near the Bell-shaft tunnel, and a little outside, the only place where I have noted it down. I attached very little importance to it, and I have not registered the precise place.

Q. What place was it?

A. Some distance outside of the Bell-shaft tunnel, but I noticed several other places in walking and driving about, and said "There is a distinct stratified limestone." But it was a matter of such constant occurrence that I did not think any more of taking it down than I did of the sage-brush.

Q. It is very common there?

A. Yes, sir.

Q. Did you see any of that inside of this zone?

A. None in what I saw was a zone. The very conditions of this was such that larger or smaller masses would probably escape the crushing action, so I was quite prepared to find masses from an inch in diameter and upwards, and if you showed me a mass fifty feet in diameter I should not be surprised.

465 Q. Which is the softest rock, the shale or the limestone?

A. Limestone is brittle and shale is tough. Shale yields and slips and has a toughness which makes it a very tough rock. If you had to cut it with your knife you would find the shale very soft, and you could indent it with your hammer, whereas the limestone would be brittle, although much harder than the shale.

Q. You have a piece of shale behind you, haven't you?

A. I have nothing that I can identify as a body of shale here.

Q. Wouldn't any great crushing force exerted on limestone on that hill crush that shale to atoms in an instant before the limestone was broken at all?

A. The crushing force would make that shale slide by itself, and it would pinch up in places and thin out in others. But as to that matter the limestone is crushed, and there is the fact before us. We may form the hypothesis of what might have been, but these are facts and not hypotheses.

Q. You are not dealing with theory at all in your testimony?

A. Some questions of theory must come up, because I am asked how the ores get in there. But when I speak of the crushing of limestone, or the occurrence of ores, I am dealing with facts. When you ask me how these ores came there, I am obliged to go back to chemical theories.

Q. Suppose it should be proved that limestone was about as badly crushed on the outside of that zone as it is on the inside, would it have any influence on your opinion?

A. These I have already repeated; the very conditions of
466 crushing are such that I should not be surprised at all to find outside of this plane crushed material any more than I should to find crushed material inside of it; because this great irregular mass of material crumbling and bulging as it does, would in all probability catch masses outside of the shale and crush them, just as the bending of a mass might project within the shale a certain portion.

Q. Suppose it to be a fact that the limestone outside of the shale is quite as much crushed as on the inside, that it is quite as much stained with oxide of iron as it is on the inside, that it contains ore in many places, what would the knowledge of those facts have upon your opinion in regard to the limits of that?

A. If those masses are contiguous to the great ore-bearing zone, I should say that they are hardly samples of this crushing action extending outside of the narrow, overlying shale strata.

Q. What would be the limit of the lode in that case?

A. The limits of the lode in that case would be the limit of the ore-bearing mass in that direction, unless it was separated by some barren rock. If you will show me on the other side a hill or an intervening valley, practically, I say, there is a limit to it, but if it is in a mass practically contiguous to it, I should look upon it as one and the same.

Q. Iron is the most widely distributed of all metals, isn't it?

A. Yes, sir; I suppose that is true, unless it may be gold.

Q. Very few rocks are found that do not contain a small percentage of iron?

A. Iron is the most common coloring matter in rocks.

467 Q. The rocks, as far as you have examined them there, have been more or less colored?

A. I have yet to see any rocks that have not more or less iron; the quartzite has grains of pyrites in it. And I presume there is not a cubic foot of limestone anywhere that has not the crystallizations of iron; and grains of pyrites, which are the most common impurities in limestone, and through decay gives iron stains.

Q. You do not regard iron stains, then, as any indication of an ore-body or a lode of ore in that district?

A. There are iron stains, such as I found in the quartzite, and there are stains which will be found in almost any substance, sandstone or the marbles, which have little significance; but I speak of these masses that have greater or less pulverent iron matter connected with the larger masses of the same kind. Where I find a mass 10 feet in diameter, and then another of a foot, and another of an inch, and from that to pepper-grains, in the same rock, I consider they belong to the same ore. It is impossible to distinguish

between the greater and the less, except so far as admissions are concerned.

Q. You don't regard the iron stone of itself, then, as any evidence of an ore or an ore-body?

A. An iron stone is ore. It indicates the presence of a little oxide of iron. But I speak of the iron stains as they occur in that limestone. Patches and grains and masses of granular iron oxide, which, wherever they have been found in that mass in sufficient quantities to assay, are more or less impregnated with metal. The assays of that are such as to show that they are of common origin.

Q. I mean the ore exposed—gold, silver, and lead, and not of iron. Are iron stains in the rock of that district any indication of the vicinity of a body of ore?

468 A. So far as this deposition goes, I believe they are. Because, to the best of my information, wherever you have those masses of iron matter, they contain quantities of other metals—lead, gold, and silver—one or more of them.

Q. I am asking you the question, not in reference to this particular zone, but in reference to the rocks generally of the district, and a portion which you have examined.

A. My observations have been confined to three days in the immediate vicinity of Ruby Hill, and I can't discuss what is found outside of that.

Q. Did you find the rocks found outside of Ruby Hill stained in with iron in very many places?

A. Undoubtedly. In San Francisco Park, that is also true.

Q. Do you consider the iron stains as any indication of ores of gold, silver, or lead?

A. Not by themselves; they are evidences of iron, and nothing more or less. But where they occur in an ore-bearing zone, and where fifty or one thousand assays have shown that this iron ore occurs with these metals, I consider that finding a portion of this is strong probability that this one thousand and one specimen will carry the metal.

Q. You are testifying to a great deal that you are not acquainted with, are you not, when you talk about the thousands of assays?

A. I know that the ore has been melted for years, and they make daily assays of the ore which goes to the furnace.

Q. What is the relative toughness of the quartzite and the zone of limestone between the quartzite and the shale?

469 A. I have made no experiments upon the comparative strength of the material, but I will observe that when I got a little distance from the contact that the quartzite is very hard, ringing under the hammer, and what I should call very much harder and tougher than dolomite. In the immediate vicinity of the limestone the quartz is apt to be disintegrated and soft in its character; due, as I imagine, to the influence of these infiltrated waters, which has so profoundly modified the zone.

Q. The quartzite is very much more broken up than the limestone, and in much smaller payments wherever it is found in that zone?

A. I am not aware of that. So far as I have seen it, along the foot wall, it does not appear to be broken. It is finely granular, where I was cutting in the quartzite, which was, I think, in the lower levels of the Eureka shaft, where the shaft is gone down into the body of the quartzite. I did not see that it was broken at all.

Q. As I understood you in the start, the body of the limestone laying between the quartzite and the shale did not, by the simple process of crushing, become a lode; that subsequent to the crushing it was necessary that it should be filled with ore in order to make it a lode. Has the whole body of that limestone been filled or is it now filled with ore?

A. The whole body of the limestone is not filled with ore, but the whole mass has ore disseminated through it, and the limestone, of course, remains, because it has not ore through all of the wall, except in two or three places. There is a great mass of included rock matter, as is common in a vast number of such veins; I consider the whole mass of limestone is included in the lode, but not in the zone.

470 Q. You have heard other witnesses testify that there was 100 feet of limestone to one foot of ore in that zone; what is your judgment about that?

A. I should think it might be extremely probable, though I had not had an opportunity of calculating. It would not be a strange proportion. There are very large lodes which are made up almost entirely of fragments of rock, with little seams of ore penetrating them in every direction. I never went through any considerable distance of that limestone, but saw but 3 or 4 in which I did not find bugs or patches of what I regarded as ore. So I regard the whole mass as impregnated with ore, which is sometimes accumulated in large masses.

Q. What is a zone of impregnation?

A. A zone of impregnation would be defined as a rock which had been penetrated in a more or less irregular manner by some other foreign substance which would be said to be the impregnant substance. It is a term of not quite scientific accuracy, but it is a term which I think can be understood by all those who hear it.

Q. Is not it a term applied to a class of deposits in which the metal is found disseminated in small grains throughout the mass of rock?

A. Not necessarily; the metal may be disseminated in a mass of rock by some other process than impregnation. The designation refers to the mode of its distribution, and impregnation the way in which that distribution is effected.

Q. I am not speaking of the effect of impregnation. In relation to the former character of what you call impregnations, whether

they do not consist of small grains of metal, disseminated throughout the mass of rock?

471 A. There may be small grains, more generally small strings than small grains. You may have a mass of rock impregnated with grains, and still it may not be an impregnation.

Q. Are the lead deposits of the Mississippi Valley of dolomite?

A. Yes, sir.

Q. All of them?

A. So far as my experience and others go I believe they are. They extend occasionally for limited distances into other rocks, but they are essentially confined to the dolomite. In Wisconsin they have attempted to trace the lead into the blue limestone beyond with very little success, There are thin layers of sandstone intercalated into this magnesian limestone deposit, which carry them, and they are essentially magnesian limestone deposits; still I do not find them with this, because this magnesian limestone in the Mississippi Valley, so far as I have studied it, is in nearly horizontal strata, in which there have not been such movements of crushing and disturbance as we see in Ruby Hill.

Q. What proportion of sulphur is there in galena?

A. In galena we have, I think, about 86 per cent. of lead and 14 of sulphur, fractions omitted. It is a definite compound of an atom of sulphur and an atom of lead—84 atoms of lead and 16 of sulphur.

Q. Of what are carbonates composed?

A. Carbonates may be said to be composed, according to the old nomenclature, of oxide of lead, plus carbonic acid.

Q. I speak of the carbonate of lead. What proportion of carbon?

A. In the case of lead the equivalent of lead is 104 com-

472 bined with 8 of oxygen, and one equivalent of carbonic acid; one equivalent of 6; two of oxygen 16; six of carbon, 24 oxygen, and 104 of lead.

Q. What amount of sulphur is contained in sulphuret of iron?

A. There are divers sulphurets of iron. The commonest form of iron pyrites contains about 28 parts of iron and 56 parts of silver. They are less frequently found than sulphides which contain much less silver.

Q. Upon the iron oxidizing it loses its sulphur and takes up some other elements, does it not?

A. It takes up oxygen, and in ordinary conditions, water; forming in most cases a hydrous peroxide of iron.

Q. What proportion of oxygen does it take up?

A. Twenty parts of iron takes up 12 parts of oxygen and forms the peroxide of iron, which combines ordinarily with 15 per cent. of water, forming an ordinary hydrous peroxide.

Q. The quantity of sulphur lost is much in excess of the elements taken up that replace sulphur?

A. Undoubtedly.

Q. Did you say in your direct examination that after the sulphides of lead, or of galena, were dissolved it would be reconstructed into sulphurates again?

A. I didn't speak of galena being dissolved in my direct examination. I said it might be oxidized, and the oxidation products might be dissolved and they be reconverted into sulphuret again. Whether this has taken place in any individual case in this mine I am in doubt; but the black discolorations and the galena and the aspect of some of the carbonate of lead gave me to infer that it had taken place. It has taken place to a very large extent in other mines I have examined; where other sulphurets have been oxidized and reconverted into sulphides. This is going on on the
473 surface of the earth wherever water holds in solution organic matter.

Q. Have you ever been on this coast before?

A. Never, sir.

Q. You said something about miners universally calling that a lode up there?

A. I don't know whether I used that expression.

Q. Did you use some expression equivalent to that?

A. I said that a mine of ore-bearing rock like that, in my opinion, was, according to miners' usage, entitled to be called a lode. I have some knowledge of the literature of mining, although I am not familiar with mining on this western coast.

Q. There are none of the reasons in the east why lodes and zones of rock containing a number of lodes or deposits of ore should be distinguished, are there? In the east the mines are all worked by parties owning the surface, are they not?

A. I am not competent to discuss mining laws. I must plead ignorance as to the precise meaning of the law.

Q. You don't know whether the lands in which the mines are situated are sold by the government or not, and that the proprietors work the lodes simply to their exterior limits and then stop?

A. I know that is the case in Canada, where for twenty-five years I have had a great deal to do with mining operations.

Q. There the questions of dip and questions of that character are of no importance at all, so far as ownership are concerned?

A. With reference to mining law I should rather be excused from answering questions.

474 Q. You don't know much about the opinions of miners in reference to mines on this coast and what their usages and customs are, I suppose; never having lived here?

A. No, sir; I know generally from having read mining reports every year of this country and vicinity, but I looked at them rather from a scientific point of view, not having been interested in questions of this kind, and I am not prepared to discuss the questions of mining law.

Q. You passed up through the winze from the 9th level to the 8th, 7th, and 5th of the Eureka, didn't you?

A. Yes, sir.

Q. What forms the bottom of those winzes?

A. Quartzite.

Q. All of the way up?

A. All of the way up, so far as my observation goes; they are cut into the quartzite through the ore.

Q. There are winzes along the face of the quartzite?

A. Yes, sir; I should think all the way.

Q. What part of the works of the Richmond did you visit?

A. After going along this cross-cut in the 9th level of the Eureka I reached the Richmond workings by going down a winze of 30 feet leading along the quartzite, and thence through certain small galleries and considerable areas of stoped out ground, I found my way into the Potts chamber, and thence across the Potts chamber up to the wall of shale which I met with at some distance from there. I then afterwards went down into it from the Richmond shaft and went through the 7th and 8th levels, going again into the ground which I had seen on my previous examination when I had entered it from the 9th level of the Eureka.

475 Q. Where did you find shale above the Potts chamber in the Richmond mine?

A. I found a mass of shale lying, I think, in the 7th or 8th level.

Q. Is that above the Potts chamber?

A. I couldn't say whether it was above it or not. [Refers to notes.] It was going down the Richmond shaft in the 7th level, which passes through the shale into the quartzite, and thence I went southeast with the quartzite on the right hand and then I struck on the northeast irregular course across the vein, and there I found a drift running along a wall dipping steep to the northeast, and thence I came to a shale; and I followed this drift irregularly 150 feet to the northeast and then struck a dark-colored clay shale, the two having stratified limestone in between them. There was apparently shale in two lines there.

Q. Will you point that place out on the map?

A. I am not familiar with the map, and I don't know whether I can. I made a rough sketch on the ground. [Showing on the map.] This, I think, is the 7th level, and here, if I mistake not, I saw shale.

Q. Where is that?

A. Between 7 H and 7 G on the 7th level, I think, but I really am not prepared to say with regard to the details of that shale.

Q. What portion of the Eureka mine did you pass through?

A. Having gone as a stranger into that mine, and having many things to look at, and not having the familiarity with it of the other gentlemen, I cannot point out my way there as quickly as I otherwise could. In the Eureka shaft I went down the 9th level 730 feet from the surface, and from there passed through a cross-cut

476 68 feet long, entering a lode. This cross-cut was carried 150 feet to the northward, where there was an influx of water

which had been checked by a bulkhead. One hundred and ten feet from the quartzite I found, following along a drift, another cross-cut, which is carried north 64° west, and thence 180 feet further another cross-course goes northeast to the hanging wall, and there is stopped, on account of the stream of water; 90 feet southward it strikes a foot wall of quartzite. Here I cross a seam of ore, and then I followed into that bulge of quartzite and around that bulge of quartzite. After passing through that barren rock with bugs of ore for 240 feet, I then found a cross-course which led me to the bottom of the winze between the 8th and 9th levels, by which I went into a vacant chamber at the bottom of the 8th and 9th levels. Then I came up along that under wall of quartzite, tracing the ore continually up to the 5th level. That, I think, answers your question as to what I saw in the Eureka workings.

Q. Those are all of the workings you visited?

A. Those are of all the workings I visited of the Eureka; I visited the workings in the Jackson and K. K.

Q. Have you given us all that you saw in your visit to the workings of the Eureka, so far as you can recollect them?

A. All that I can recollect now; if I should look over my notes and collect myself, I might find other things.

Re-direct examination:

Mr. Thornton.—Q. If a solid body of iron pyrites were converted by oxidation, solution, and precipitation into hydrated peroxide of iron in a purulent form, would it occupy more or less space than before?

477 A. In answer to that question I would say that the oxide of iron deposited in that way is always extremely porous; it is never compact, and it would doubtless occupy a very considerable larger space than before. How much larger its bulk would be, would be determined by the porosity of the mass.

Q. How would it be under similar circumstances with galena?

A. I should have to make that the subject of calculation. My own impression is that there would be a very considerable augmentation of volume; that, however, would affect the case in no way materially, because when galena oxidizes in that way it does not rest altogether *in situ*. It is taken in solution.

Re-cross-examination:

Mr. Wren.—Q. The process of oxidation of iron would result without any reference to any portion of the iron being carried off, in making the bodies porous, wouldn't it; the sulphur being greatly in excess of the elements that are added during the process of oxidation?

A. I think not; because the condition of the iron changes very much. It assumes a different volume in the oxidized compounds from what it does in the unoxidized ones; just as when I convert a mass of steam by intense heat into oxygen and hydrogen gasses, the liberated gasses probably occupy more space than the steam itself.

Q. I understood you to say that there was about 50 or 60 per cent of sulphur in the iron?

A. About 52 per cent.

Q. Then the oxidation removes about 52 per cent.?

A. Yes, sir; but it changes the 48 per cent of iron into a substance of a very much less density than the iron itself, and the volume is thus increased.

478 Q. A reduction of 52 per cent. of any solid body would be very likely to result in the body being very much more light and porous than it was?

A. There are cases of that kind. But I may take a cubic foot of steel, which contains one part of hydrogen and eight parts of oxygen; and take away that eight parts of oxygen, and have two cubic feet of hydrogen.

Q. Sulphuret of iron is a solid body of great density, isn't it?

A. Yes, sir.

Q. The sulphur being intimately, and perhaps chemically, combined with the iron?

A. Yes, sir.

Q. Now, the removal of this sulphur, chemically combined with the iron, unless some other elements were added during the process of oxidation, would reduce the weight of the iron?

A. Undoubtedly.

Q. Then it would leave the body much less dense, and, as a result, more porous and lighter than it was before the process of oxidation?

A. It does not leave iron. It leaves the hydrated peroxide of iron, which is a substance of small specific gravity, and therefore occupies a large space.

Q. How much water is added to it?

A. Fifteen per cent., by weight, of the peroxide.

Q. How much oxide?

A. 28 parts of iron combined with 12 parts of oxygen, and, I think, 18 parts, by weight, of water. But there is a question in these which I must say you fail to comprehend. Each substance has its own specific gravity; iron has its specific gravity, and the peroxide of iron. So, in these chemical transitions, there are numerous changes of bulk. To illustrate that now, take a certain substance which contains, in its pores, the crystals of pyrites. Now,

479 that form of pyrites is very subject to oxidation, and when it oxides it does just what you see; it loses its sulphur and becomes converted into hydrated peroxide of iron, which it so happens, occupies a smaller space, notwithstanding it loses its sulphur. And it swells so much that it cracks the limestones and they go to ruin. That you can see in many of the sandstones in the buildings in our cities.

Q. If this process takes place under a pressure of some hundreds of thousands of feet of dolomite it probably would not burst that?

A. It would not take place at all if it had not the room to expand. It is impossible in the nature of things. Peroxide of iron has its own volume as much as the pyrites have, and if you positively prevent all expansion, you would prevent all chemical change requiring an augmentation of volume. I speak with confidence, because this is a subject which I have specially investigated. But your very hypothesis supposes there were void spaces; because water is coming down through to bring the oxygen. How are you to get the oxygen from the water to make this conversion, unless you have space communicating with the surface?

Q. Those spaces that admit the oxygen might be of exceedingly small dimensions, might they not?

A. They must be large enough to bring down water containing oxygen enough to effect this change; and if they were very small the expansion would stop them up, and perhaps the action would come to an end.

Q. Do you know whether or not it is a fact that lodes in this country, where they contain a large amount of sulphurets of iron, or iron pyrites, are not enlarged by the oxidation of the iron, but are found to be much more porous after its oxidation than
480 they are at lower depths where oxidation has not taken place?

A. I can hardly conceive that. The oxidation of pyrites, in many cases, removes a large part of the oxide of iron. The oxidation of pyrites is not an action pure and simple, involving the conversion of the whole of that iron into peroxide, but converting into a soluble form a large quantity of that iron which runs out in the form of the sulphate of iron. The consequence is that the waters which go from it, as I have stated, take iron in solution. So I can answer: the decomposition of pyrites may result in the removal of a very large portion of iron, like in galena, where a great part of the lead is taken out in soluble form.

[Here a recess is taken until 2 o'clock P. M.]

481 AFTERNOON SESSION.

FRIDAY, *July* 27, 1877.

J. E. JAMES, sworn.

Mr. Thornton.—Q. Where do you reside?

A. Virginia City, Nevada.

Q. How long have you resided there?

A. Seventeen years.

Q. What is your occupation?

A. Surveyor of mines.

Q. Have you been engaged in that occupation at Virginia City; and if so, during what time?

A. Since the year 1860, up to the present time.

Q. How general has been your work in the survey of mines in Virginia City?

A. Very general on the Comstock lode.

Q. How many mines?

A. All of them located on that lode.

Q. Have you practiced that profession at any other point or examined or surveyed any other mines than those?

A. To a very limited extent.

Q. Have you examined any mines?

A. I have examined the mines at Eureka.

Q. No other but those at Eureka, during this last 17 years?

A. None of any importance. I have those mines—some in Humboldt county. The Arizona mine in Humboldt county.

Q. Have you personally examined any mines anywhere except on the Comstock lode, during the last 17 years?

A. I have; some in California.

482 Q. What kind of mines?

A. Gold mines.

Q. Can you name some of the districts in which you have examined mines?

A. I have examined mines in Kern county; I believe that is about all.

Q. Have you ever been engaged in mining personally?

A. I have.

Q. When did you examine on Ruby Hill?

A. During the month of July?

Q. When did you go there first?

A. On the 9th day of the month.

Mr. Wilson.—Q. What month?

A. The ninth day of this month—July.

Mr. Thornton.—Q. What mines did you then examine there?

A. The Jackson, the K. K., the Richmond, and the Eureka.

Q. Can you state generally what you observed upon the surface of those mines?

A. I observed upon the surface of those mines a cropping of limestone in which the working of the mines were.

Q. Did you see anything but the limestone; any other kind of rock?

A. Yes, sir; I saw on the surface also croppings of quartzite and of shale, and of different limestone from that in the face which was being worked.

Q. Did you see any ore-croppiugs on the surface there?

A. I did.

Q. Can you state what point?

483 A. At a point on the Richmond mine; also some points on the Eureka mine. I can point it out if you wish.

Q. I wish you would point out the croppings which you observed.

A. At the point marked "surface ore-chamber" on the Eureka; and also on the Richmond, where I am pointing, marked S B and S A. This point I do not see any mark on, except "covered ground"—"ore-chamber."

Q. Are you certain where you did find those croppings upon the Richmond?

A. I found them near the road—I do not see the road on the map—on the south side of the hill.

Q. Were there any workings going down from those croppings or in the croppings that you saw on the Richmond?

A. There were workings going down where I entered, for a short distance.

Q. From the surface you entered and went down for a short distance in the workings in those croppings in the Richmond?

A. Yes, sir.

Q. Below the croppings?

A. Yes, sir.

Q. Did you observe any other points of croppings of ore upon the surface of the Eureka mine except those you have pointed out?

A. Two or three points: one called the Iron shaft. I found some smooth croppings, smooth bunches of ore in the shaft, and at another point along the road, where I found a little ore.

Q. Can you state on the surface of which the Iron shaft is situated? Were you told at the time?

484 A. I was not told where it was that I recollect. I noted where it was from some surface workings there. I will have to refer to my notes about that.

Q. That is not important. It is over the line of the Richmond?

A. Somewhere there.

Q. You say that at the mouth of the Iron shaft you found some ore or indications?

A. Yes; I found some ore in the shaft, at the top of it.

Q. How was that ore situated?

A. In the crevice of the rock.

Q. As if in place, or as if put there?

A. It was in place at the top.

Q. Then, did you examine the underground workings of those mines?

A. I did.

Q. Now state generally what you observed of moment or importance in the K. K. mine.

A. Do you want me to state generally?

Q. Yes, sir; generally.

A. I found in the K. K. mine a large number of workings, openings, tunnels, and ore-chambers, where men were extracting ore and doing work—mining.

Q. Did you find any quartzite?

A. I did; I found quartzite.

Q. At what point?

[The witness examined his notes.]

Q. I won't detain you on that, as we generally agree, I think, on the quartzite. Can you state in what levels you found it?

A. Yes; I will tell you in half a minute. In the "second level, first right-hand cross-cut," as marked here. There are two places in the second level.

Q. Are the points marked on the map?

A. There are no letters on it. It is not lettered.

485 Q. Not lettered at the points where you found it?

A. No, sir.

Q. Name the two points as you did name that.

A. At the first right-hand cross-cut; the first right-hand cross-cut, and also the second right-hand cross-cut.

Q. For what distance was it exposed on either of those places?

A. About 20 feet.

Q. On both places, or 20 feet at each?

A. Twenty feet in the second right-hand cross-cut. Let me see if I can find that [examines map]? In the first hand-hand cross-cut, 20 feet.

Q. Exposed for about 20 feet in the first right-hand cross-cut in the second level?

A. Yes, sir.

Q. How much was the exposure at the other cross-cut?

A. I guess nearly the length of the drift; about six feet; merely across the drift.

Q. Then, did you find it exposed on the 3d level anywhere?

A. Yes, sir.

Q. At what point?

A. From the end of a cross-cut running to the southward from the main cross-cut, which is not marked, but I find it here. Let me look at this again?

Q. Without waiting to find the point, can you state the length of the exposure that you saw of quartzite on that third level?

A. About 30 feet. That was the right-hand wall; about 40 feet of the foot wall.

Q. About 40 feet of the drift is on the foot wall?

A. Yes, sir.

Q. On the third level?

486 A. Yes, sir; and about 120 feet along the stopes on the foot wall. My memorandum reads: "90 feet from the first cross-cut to the wall, 80 feet east, filled; northeast, 160 feet; thence across the vein in low-grade ore to foot wall, 40 feet; thence along the stopes westerly about 120 feet to the foot wall.

Q. On which level is that?

A. It is on the 3d level.

Q. How did you find it exposed? State generally, if you can, how you found it on the entire lower levels of the K. K. Exposed for what distance?

A. I found it exposed to the 4th level in the winze for 75 feet. Let we see if I can find that [examining map]—4 C to 4 A.

Q. What is that distance?

A. I cannot tell without measuring on the map.

Q. Never mind. It is 4 C to 4 A?

A. Yes, sir.

Q. Now then, I will ask you about those points you have seen before pursuing any farther. What was the appearance of the quartzite as exposed at those points which you have described?

A. It was generally smooth and soft, containing, in every case, a little ore on the foot wall.

Q. How was it made smooth? Did it indicate how it was made smooth?

A. I think it was made smooth by motion.

Q. Were there any signs of motion?

A. Yes, sir.

Q. What?

A. It was striating in places marked.

Q. What kind of motion did it indicate? Motion lateral or vertical?

A. Vertical.

487 Q. Vertical motion?

A. Yes, sir; that is, vertical along the wall. Of course it would be along the top of the wall.

Q. What was the size or dimensions of any ore you found at these points? You mentioned finding ore there.

A. In the K. K.?

Q. Yes, sir.

A. Well, I found some places where the ore was soft at the hanging wall, the same place where the ore still remains in the wall where it was stoped. It was perpendicular; as large as the stope. Where it remained it was not so extensive.

Q. Well, did you in the K. K., above the 4th level, at any point, follow the ore from the foot wall for any distance?

Q. Was there any ore or stopes from which it had apparently been taken?

A. From the 4th to the 3d we followed the winze.

Q. How was that winze with reference to the foot wall?

A. It was on the foot wall.

Q. Did you follow any of that on towards the north or northeast.

A. Are you speaking of any particular level?

Q. Only the level above the 4th.

A. We followed that ore north and northeasterly for a considerable distance.

Q. Well, what was the greatest distance?

A. Which way do you call north here?

Q. This is the northeast [pointing].

A. Well, then, this is northwesterly—that way [pointing].

488 Q. Well, you followed it in a northerly direction, did you? State any direction in which you followed the ore in from that wall.

A. From the foot wall—I will have to refer to my notes again [examining]. In the K. K., 2d level, we found ore from the shaft to the first right-hand cross-cut in a southerly direction, and ore again towards the end of that level, a distance of about 200 feet, I should think. This was not very rich. It was low-grade ore in this level. This is in the second. In the third level, in the first level along the branch, is ore extending for 60 feet to the hanging wall; and at the north end of the cross-cut is a winze, which is 45 feet on the hanging wall. There is ore from this point to there [pointing], and is exposed 30 to 40 feet. The ore in this level extends from the hanging wall to the foot wall north of the third level.

Q. Did you pass through or trace the ore from the foot of the hanging wall on that level.

A. Yes, sir.

Q. Or nearly?

A. Yes, sir.

Q. How near can you tell how near it came to the hanging wall?

A. Well, it came within a few feet; I suppose about three feet of it?

Q. How near did it approach to the quartzite wall?

A. Well, about the same distance; but it did not extend entirely to the quartzite wall, but nearly. There is ore on the foot wall.

Q. To what extent at that place?

A. 120 feet.

Q. For 120 feet?

A. Yes, sir.

489 Q. What body of ore is it that lies upon the foot wall for that distance? Is it the same body that you traced there north to the hanging wall?

A. Yes, sir; the same body of ore that I traced over to the foot of the hanging wall.

Q. Well, do you mean to say that that body of ore extends to the quartzite wall, or nearly to it?

A. Yes, sir; I say in effect to the wall, the quartzite wall. It extends nearly but not entirely to the hanging wall.

Q. Well, I misunderstood you a few moments ago. How does it lay on the quartzite wall; to what extent?

A. About 120 feet to the foot wall.

Q. Well, did you find any other ore upon the foot wall, or lying upon it in the K. K. mine?

A. In that level?

Q. Yes, sir.

A. I think I have given all I found on the three levels.

Q. Well, in the 4th or 5th or 6th or 7th levels?

A. If there was, I don't know; let me see. In the 5th, but not in the 4th [examining]. There is ore on the 4th level; the ore-chamber extends from the drift in a curved direction over the cross-drift and extends down to the hanging wall. It is worked at 4 F. That is the ore I mean, I think.

Q. At 4 F?

A. Yes, sir; at 4 F.

Q. What is the color of the 4th level there?

A. It is green.

Q. You need not mind to look upon the map, Mr. James. Just go over your notes and see from your memorandum which you made at the time.

A. Well, there is one on the 4th level, from 4 C to 4 A.

490 Q. Is that upon that cross-cut?

A. That is upon the cross-cut.

Q. To what extent?

A. Well, I do not know the length or the extent of the ore along that drift. However, the wall is exposed along that drift, and there is ore along that wall there [pointing], but whether it goes the whole extent of the drift I have not memoranda to show.

Q. You have no memoranda of it?

A. No, sir.

Q. Did you see any ore upon the quartzite; upon any of the lower levels below that?

A. Yes, sir, I did, and I will show you where they are. There are spots of ore from the point 5 A. I found spots of ore here, and spots of ore from 5 A along the level to 5 B, in the 5th level. From 5 A to 5 B. The drift is timbered a good deal here. A very careful examination of it could not be made, but as far as I examined I found just what I have stated. Then there is a winze running down from this level, also the ore, for a distance of about 45 to 70 feet, where it is filled up. Could not go any further down.

Q. How is that winze with reference to quartzite?

A. It is on the quartzite. Then from the 5th level there is a winze marked 5 B, down to the 6th level, following ore all the way down. Before reaching the level there is quite a large portion of quartzite wall exposed. It is very smooth or striated.

Q. Have you made any mention of the 6th level?

A. I have given everything of the 5th level. I did not say anything about the 6th.

Q. This is in ore upon the quartzite as the levels go down from one to the other?

491 A. Let me see. As I stated before, the ore went from 5 D down to the 6th level, 6 E. Now, the 7th level is not traced up

from the 6th to the 7th. There is the 7th level; the ore follows the wall there exposed, but there is no ore there [pointing].

Q. Along there, does the 7th level expose any quartzite?

A. Yes, sir.

Q. To what extent?

A. From the point 7 A to the end of the drift.

Q. What was it along the quartzite on that level?

A. What seemed ore, though I cannot say positively. It looked like ore; redstone rock.

Q. What is the appearance of the wall along there in the 7th level?

A. It has the same appearance as described before.

Q. Smooth, with marks of striation up and down?

A. Yes. sir.

Q. Now, you have stated that you have seen shale on the 3d level.

A. Shale on the 3d level.

Q. Any points exposed?

A. Well, it is exposed at 5 B. No, it is exposed from 3 R to nearly 3 D.

Q. On what other level of the K. K. did you see it exposed?

A. On the 3d level. I want to point that out. [Examining the map.] I did not mention the 3d level. Yes, that is the same one I did mention.

Q. Yes, you mentioned the 3d level. Look at the 2d now.

A. Yes, sir; I have it on the 2d level exposed for 35 feet. No; the drift ran through the hanging wall there; the point marked 2 L.

Q. For what distance is it exposed there?

492 A. About four feet along the wall, and six feet up and down.

Q. Mr. James, commence now with the 5th level of the Eureka Consolidated, at the Lawton shaft, and describe what you found in the 5th level.

A. Going through drift 5 A, we are in limestone; also, there are spots of low-grade ore, until we come to 5 B. About 30 feet in that drift the quartzite wall crosses the drift, recrossing it again 12 feet further on. Then the drift faces to the right of the quartzite wall. We are now at the end of the drift, at the ore-chamber. Between the ore-chamber and the point where the drift leaves the main drift in the wall, there are various small stopes and winzes; one at 5 C, which goes down to the 6th, on the wall of the ledge.

Q. Well?

A. Also, one is up to the 4th, at the same point. Near the winze there is a small stope, near the wall. This is a stope to the 5th level. This runs on the quartzite wall. There is a small stope near 5 C, away up on the wall, about 20 or 30 feet, as I would see up. There is ore here, and ore along the wall in this drift; not continuous, but in spots.

Q. Along where?

A. I say there is some ore in spots along the wall in this drift. It is not continuous, but it is in spots; ore from here to there—more particularly found near the winze 5 C. Very little is to be seen between there and the end of the drift; perhaps not any.

Q. Now, what is the appearance of the wall along that drift, before you reach the ore-body at the end of it?

A. It is a very well-marked wall; it is smooth and soft, and easy to pick into.

Q. It is smooth?

493 A. Smooth and soft.

Q. Does it show any signs of motion, Mr. James?

A. Yes, sir.

Q. What kind of motion?

A. Vertical motion along the wall.

Q. Now, take the next level.

A. The 6th?

Q. Well, skip the 6th and take the 7th; as the 6th is so short.

A. In the 7th the shaft at first is in quartz, and the quartz continues for 50 feet. In the 7th level, in the quartzite at that point there is a little ore. Near the first cross-cut I find some ore; near the first cross-cut; it is a continuation to the point about or near 200 feet. It comes in here again at the end of the 200 feet, or 150 feet further on. Some ore comes in again and extends for 20 or 30 feet beyond the shaft marked 7 H, through the winze. The level follows the foot wall from about 7 J to 7 L. At the time that I visited it there was a drift being run on the foot wall from 7 L toward 7 S.

Q. How far did that drift extend?

A. Well, it was extended 17 feet from the winze.

Q. What was found in it?

A. Ore along the wall.

Q. Well, now, what is found in the continuance of the level from 7 L?

A. There was found ore, nearly the whole of the distance from that point to the end of the level.

Q. Altogether, the entire distance, to the end of the level?

A. Yes, sir.

Q. Now, what is the appearance of the foot wall—is it exposed in the drift, or level?

A. It is, as I have described before.

494 Q. Now, take the 8th level.

A. Do you want a description of the 8th level?

Q. Yes, sir.

A. Taking the right-hand branch of the 8th level, 60 feet from the shaft the wall is crossed. Well, that is right; about 60 feet from the shaft [examining]. There are a great many branches to this drift; there is nothing in the drift—barren limestone—until you come nearly to the ore-chambers; they commence at 8 S.

These barren spots extend from 8 D to 8 E or 8 F. Rather, about 60 feet farther [pointing], which goes about 20 feet to the south of 8 F. At 8 G there is a foot wall cut in the drift from where the winze runs up from the 7th station. The foot wall is again cut in the drift at 8 H, and is followed along the level.

Q. At 8 G and 8 H, where the foot wall is cut, is there not ore?

A. Yes, sir; there is ore at both places.

Q. At both of those points?

A. Yes, sir; lower-grade ore at both places.

Q. The drift continues, then, barren to what point?

A. Well, for 150 feet to some place near 8 J.

Q. Now, commence with the 9th level.

A. It is about 68 feet, taking the main drift in the 9th level, going from the shaft, after you come to the foot wall on the ledge. Going through the drift, you go through limestone—barren limestone—until you come to 9 C. At 9 C there is some ore; there is some ore found at 9 C. From that point there is a winze running up, near that point. The drift continues then in this barren limestone until you come to 9 H. There is some more. The wall is crossed twice in that distance, and then there is some more ore at 9 H. It appears quite poor, and probably it is. It extends in
495 the cross-cut to 10 A, and for a distance on to the next cross-cut, marked 9 N.

Q. There is ore there?

A. Yes, sir; there is more ore there at 9 M. The end of the drift is in the ore-chamber. Beyond the ore-chambers the drift connects with the Richmond mine.

Q. Do you see point 9 N on the map?

A. Yes, sir.

Q. From point N to the edge of the ore-chamber, what is found?

A. Ore.

Q. What kind of ore is that that is found there?

A. Some of it is very fair ore—good ore; at 9 N it is good ore in the chamber.

Q. To the edge of the chamber?

A. Yes, sir.

Q. Mr. James, were you not in the extreme end of Eureka third level, where the work was going on, when you were last in the mine?

A. Yes, sir.

Q. Somewhere near the point marked on the map 3 P?

A. Yes, sir. Let me see about that [examining]. Yes, sir; I was there.

Q. What was the appearance in the face of that drift, as it was being driven west?

A. It looked like that ore there. I have a sample of ore taken from there.

Q. You took a sample of ore from there?

A. Yes, sir; marked sample 44.
Q. Marked what in the series?
A. 44.
Q. Since then that was sent down for assay?
A. Yes, sir.
496 Q One of the series?
A. Yes, sir. That was on the 16th of July.
Q. Taken out on the 16th of July?
A. Yes, sir.
Q. Mr. James, what are the dimensions of the ore-body at the end of the 5th level, as exposed above that level—the west end of the 5th level?
A. It extends up about 21 feet perpendicularly to the top of the timbers; that is, it extends three sets of timbers in height and six sets of timbers crosswise, this way [describing].
Q. That is the 9th level. I am speaking of the 5th level.
A. I am speaking of the 5th.
Q. No, sir; this is the 9th.
A. No, sir; I am speaking of the 5th level; that is just the one I am giving you, and I pointed out the right-hand place. I took samples of a section of it at the time I was there, which represents that ore; two sets of timbers crosswise and two sets of timbers in height, on the third [pointing].
Q. What was that body of ore resting on?
A. On a quartzite wall.
Q. Did you go up any higher; did you trace it any higher?
A. This winze went up on the wall 24 feet, and there it flattened off. It went 24 feet on that dip of about 45 degrees, and then flattened off and fell away.
Q. You went up 24 feet?
A. 33 feet the winze went up. It had a dip of about 50 degrees from a horizontal; then it was nearly horizontal for about 25 feet.
Q. How much of that distance up was upon quartzite?
497 A. All of it. No, not all of it; I beg pardon. It was up higher [pointing], commencing at quartzite at the bottom and ended at the quartzite at the top.
Q. What became of it at the top here. Did it give out then, or was it proceeding any farther up?
A. No, sir; that was as far as it was being worked at that time, up.
Q. That would carry it up on to the quartzite about how many feet above the level?
A. About 58 feet, measuring along the excavation.
Q. Along the dip of that wall?
A. Yes, sir.
Q. Now, did you go below the 5th level?
A. Yes, sir; I went all the way down from the 5th to the 9th.
Q. Now, describe what you passed and what you saw.
The Witness.—Give it particularly?

A. Very particularly from there down.

A. Well, I will just give my descriptions as I prepared them. Leaving the ore-chamber in the 5th level, I found the same kind of ore from the 5th to 6th as was taken out of the 5th. This follows down on the wall from the 6th to 8th to a nearly horizontal dip. I found the same kind of ore from 7 to 8 as I did from 6 to 7. They are all alike from the 8th to 9th, and follow still on the wall. The same ore was there from 7 to 8. At 9, 16 feet down from the sample 8, I found the same kind of ore from 8 to 9 and 10. Sample 10 was down in the foot wall at the dip of the winze from 6 to 7. Number 11 was 18 feet down that winze. Number 12 was 50 feet down the winze. The same kind of ore from 16 to 12 as at 11.

498 Then I went horizontally to the dip of the fourth ladder, where I took sample 14. This was also in the wall—the same kind of ore as from 12 to 13.

Q. What is it marked on the map?

A. 13. 14 was taken 18 feet from the top of the fourth ladder; two feet from the contact; two feet from the wall. The same kind of ore from 13 to 14. It is about 40 feet down from the 14 to 15; about 50 feet slope. 15 is the foot of the winze from the 7th gallery on the wall; the same kind of ore from the 14th to the 15th; 17 is the bottom of the winze; end of the 7th; 48 feet down is the same kind of ore from 16 to 17.

Q. On the end of the 7th level?

A. Yes, sir.

Q. Now, in passing down these winzes and along the course which you have described from the 5th level ore-body to the 7th level, how large was the body of ore there which you passed?

A. It varied in thickness. It was very large on the 15th level chamber, judging from the amount of ore taken from the stope; and going down some part of the winze would be all ore and some only a portion of it ore. Of course, where it was ore all around me I could not tell how thick it was.

Q. How narrow was it at the narrowest point? How was it between the 5th level ore-body and the 7th level through that course you pursued?

A. It was not any of it very narrow, but I cannot give you the exact width of it all the way down. Probably six inches would be the extreme. It would not be any less than six inches.

Q. Did you examine it very closely?

A. Yes, sir; all the way.

499 Q. Now, pass on down from the point where you reached the 7th level and take your course from there.

A. 15: foot of the winze in the 7th gallery on the wall; the same ore as found in 14 and 15. I read that before. 16 is the end of the 7th level; west, at the top of the winze, there is ore from 15 to 16, on the wall. I did not note that it is the same kind of ore as either of the samples. 17: bottom of the winze; 48 feet

down; the same ore from 16 to 17. 18: on the foot wall, 17 feet east from the bottom of the winze to the 5th—17 feet along this drift that was being run at that time. 19: head of the winze going down to the cave on the 7th. 20: 16 feet westerly from the cave, back towards 18 on the foot wall.

Q. From the cave winze?

A. Yes, sir. Now I am going from the 7th to the 8th.

Q. Before you start down there, what distance along the foot wall was not connected there so you could not see whether there was ore along it or not?

A. I think about 6 or 8 feet.

Q. You found ore coming up to that space at one side and up to it on the other?

A. Yes, sir.

Q. And a space of about eight feet there which was not opened?

A. Yes, sir.

Q. From the appearance of the ore there, would you or would you not think it would continue along the foot wall with a space of eight feet?

A. Yes; I think it will continue.

Q. Go on down.

A. 24 is 17 feet down; three feet above the wall. There is ore from 19 to 20. 22 is 39 feet down on the contact; you go from 20 to 21. 23: 56 feet down on the contact; there is ore from 21 to 22. 24: 82 feet down; there is ore from 22 to 23—the same kind of ore. 25: bottom of winze; 18 feet from the south, on the wall; same kind of ore from 23 to 24. Up the 8th level westerly from the winze now. 26: at 27 feet from 25, near the wall; there is ore from 25 to 26. 27 is the top of the winze to the cave on the 8th level. From 26 to 27 the ore is not continuous.

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Q. Is not continuous?

A. No, sir.

Q. Where is that point? Point it out.

A. 26 to 27.

Q. What is the distance?

A. About 30 feet; no, it is not that. It is about 20 feet—20 or 25 feet. 28 is the end of the drift. There is ore from 27 to 28. 29: the bottom of the winze that goes down to the cave. There is ore from 28 to 29. 30 is in the roof of the cave, 35 feet from 29. On the 9th level; bottom of the winze. 31: on the quartzite wall. There is ore from 30 to 31.

Q. That carries you into the ore-body, does it?

A. Into the ore-body.

Q. Now, you mentioned a failure to connect that ore at one point for about 25 feet, where was that?

A. I can give you a nearer distance than that. 26 is 27 feet from 25. Now, if I had a scale to measure it, I could give you the exact distance.

Q. Never mind the exact distance. What is about the distance?

A. Say 20 feet, then; something like 20 feet.

Q. Is there any development going on there to make that tracing in any other point in quartz?

A. Not from there to there [pointing]. There was ore from 26 to 27, but it was not in a continuous sheet of the ore; it was broken.

Q. You mean to say there were patches of broken ore there; that it was continuous?

501 A. Yes, sir; I could have got other samples of ore between the two points, but it was continuous ore all the way through, as I had noted above.

Q. Was the tracing which you have given down from the 5th level ore-body to the 9th level ore-body, nearly all the way on the foot wall.

A. Nearly all the way in the quartzite.

Q. And you took these samples from the numbered places, as you have called out, from the ore up and down that distance?

A. Yes, sir.

Q. What do you say about there being an ore connection between the two bodies?

A. Well, I think there is an ore connection between them, undoubtedly. I don't know what the assays were, but it looked like ore to me.

Q. You have not seen the assays yet?

A. Yes, I have seen them; but don't remember them by number.

Q. Have you seen those that were read out by Mr. Falkenau, this morning?

A. Yes, sir; and I afterwards had a memorandum of the certificate, and looked at it myself.

Q. In going down on the 9th level ore-body, describe the tracings there in the Potts chamber.

A. 31 is the bottom of the winze in the cave near the wall; there is ore from 30 to 31. I believe those are all marked; Mr. Keyes marked them; 31, that is right. 32 is 45 feet west from the cross-drift, and about 15 feet from the end timbers of the stope of the 9th level; about 20 feet from the end of the stope. 33 is the southeast drift, 17 feet from 32. There is ore from 32 to 33. 34 is west from 33, where the hole is between the Richmond and the Eureka.

502 Between 33 and 34 there seems to be a cavity, full of sediment; it looks to me that way. 35 is the bottom of the winze, 30 or 40 feet deep, near the wall. 36 is 10 feet west of the winze, in the Richmond; 10 feet west of 35. 37 is 35 feet from the same point. 38 is 20 feet from 37. 39 is 20 feet from 36. 40 is 20 feet from 39. 41 is 20 feet from 40. 42 is 20 feet from 41, and near the stope. 43 is 10 feet from 42, in to the Potts chamber; and 44 is the extreme west end; no, that is a different one.

Q. Now, Mr. James, what can you say about that tracing between the 9th level ore-body and the Potts chamber, the course you have described?

A. I should call it an ore-tracing all the way through.

Q. You should?

A. Yes, sir.

Q. A portion of the way, you say, is filled up with a kind of sediment?

A. Yes, sir.

Q. For what distance?

A. Fifteen feet; it is a cavity in the rock, which seems to be filled up with sediment, which is laid in layers, like lamina of different colors.

Q. A strata of this different colored lamina of sediment?

A. Yes; red.

Q. Well, in taking those specimens for assay, did you assay it?

A. I did.

Q. Did you see each one?

A. Yes.

Q. Did you see how and where they were taken?

A. I did.

Q. How were these taken?

503 A. They were taken down from the point where they were selected, and put into a bag and brought down.

Q. Did you see each one of them, before it was put into the bag?

A. Yes.

Q. Right then?

A. Right then; and I saw it put in.

Q. How was each specimen, with reference to being ore, in your opinion?

A. I thought each one was ore.

Q. At the time that you saw it there?

A. Yes.

Q. You selected it for ore, did you?

A. Yes, sir; had it selected for ore; had Mr. Keyes select it, who is a very good judge of ore there.

Q. You were looking for ore?

A. Looking for the best we could get.

Q. For the best specimen you could find of ore at those different places?

A. Yes, sir; aimed to get the best there was.

Q. Mr. James, were you ever in any of the surface workings of the Champion?

A. I was in the Champion tunnel. Yes; I was in the Champion tunnel.

Q. Describe what you saw.

A. We went into the Champion tunnel and went through ore-stopes, and so forth, to the tunnel which leads to the Shaw winze;

descended through the stopes to the tunnel which leads to the winze that runs into the Lizette tunnel.

Q. What did you find at the top of the Shaw winze?

A. Well, we found we went through ore-stopes principally till we got to the top of the Shaw winze, and I think that was in ore there.

504 Q. And down that winze could you see the side of it?

A. Yes, sir; that was in ore all the way down to the ore-chamber. Well, then we went through a winze, through ore and ore-stopes, to 30 or 40 feet above the Lizette tunnel.

Q. In passing from the bottom of the Shaw winze around to the point marked "winzes," where you went down, what did you find there?

A. We found ore and what appeared to be ore all the way through.

Q. Well, in passing down the winzes, or any of them, down towards the Lizette tunnel, you found what?

A. I found ore also going down those winzes.

Q. Within what distance of the Lizette tunnel did you say?

A. Thirty or forty feet above the Lizette tunnel, then the ore ended at that point.

Q. Now, in passing on out the Lizette tunnel, from the bottom of the winze you went down, what did you find?

A. We found barren rock from the winze down into the tunnel, after getting 30 or 40 feet above the tunnel; barren limestone down to the tunnel.

Q. Then from the end of the Lizette tunnel, where you struck out in the tunnel, what did you find going in the tunnel?

A. Going in the tunnel we found that the barren rock continued.

Q. For how many feet?

A. For 30 or 40 feet, and then we found appearances of ore from there on, a distance of probably 100 feet, or within about 82 feet of the ore-chamber.

Q. What?

505 A. Within 82 feet of the ore-chamber. From the ore-chamber do you want to go through the Lizette tunnel?

Q. Yes; go on.

A. Going through the ore-chamber we passed the Lookout shaft on an incline going down, called the Ross incline; went down the Richmond first level, we found ore for 70 or 80 feet after leaving the chamber, a small, probably very low-grade ore; and then from that on, with an exception here and there, we found no ore from there on to the end of the Lizette tunnel.

Q. Now, Mr. James, did you go down the Rossiter incline?

A. Yes, we went down the Rossiter incline.

Q. Of the Richmond works?

A. The first portion has a dip of about 35 degrees, and goes through ores and ore-stopes, then down a more gentle slope to the

second. Well, the stopes are variable; sometimes steep and sometimes it is flatter, through ore and ore-stopes, down to the Richmond level. We found ore all the way down.

Q. To one of the Richmond levels?

A. To some of the Richmond works.

Q. From the shaft?

A. They call it the flat chamber. We entered from there; from there an incline runs down to the Richmond second; very hard rock going down from the flat chamber to the second level of the Richmond.

Q. Well, then, did you go on down the Richmond? Just state hastily, without any particulars, till you get to the 7th level. Well, without being particular about that, Mr. James, you went down in the workings of the level till you came to the 7th level, did you, and through the winzes and down the shaft?

506 A. Yes.

Q. Now describe what you found on the 7th level, if you can trace it from the shaft?

A. From the Richmond shaft?

Q. From the Richmond shaft.

A. I can find that. 47 feet going out from the Richmond shaft; 47 feet we find the fissure-vein.

Q. The shaft then at that place is in the quartzite, isn't it?

A. In quartzite. The level is barren and to the 7 A, containing no ore. On the right branch at 7 E the foot wall is found; extends to the angle in the drift, and is found again in the cross-cut, near 7 C, and at the end of drift 7 D.

Q. That is the quartzite?

A. Quartzite. Going on through the main drift we pass through the 7th level or chamber, and after leaving the ore-chamber through the barren limestone through the cross-cut to the left. In the cross-cut there is some little ore there, or appearance of ore.

Q. At what point is that?

A. 7 G, 7 H I am speaking of.

Q. 7 G to 7 H?

A. Yes; and beyond that there is stratified limestone to the end of the drift.

Q. Now the other branch of the drift 7 R?

A. Leaving the ore-chamber near 7 E, that branch runs through limestone the whole distance nearly. At a point 7 F, there is a cross-cut; a small cross-cut running on a clay seam to the left as you are going in. There is limestone from 7 F to 7 A.

Q. 7 F to what, Mr. James?

A. 7 F to 7 A—7 J.

507 Q. There is what?

A. Limestone. 7 J I find shale which I call a hanging wall of the ledge, and in the cross-cut to the right of that there is a winze going down to the 6th level.

Q. Beyond 7 J what do you find along the hanging wall?
A. I find the wall of the ledge. I find a hanging wall
Q. Anything else?
A. Yes; ore along the hanging wall.
Q. For what distance there, Mr. James?
A. From the cross-cut to the end; 20 or 30 feet.
Q. Did you dig down some of that ore?
A. Yes; and assayed it.
Q. Had it assayed?
A. Had it assayed.
Q. You did not assay it yourself?
A. Oh, no; I did not assay it myself.
Q. Well, judging from the appearance of it, what kind of ore would you assert it to be; low grade, or what?
A. Well, it was low-grade ore.'
Q. What is the extent of it along that?
A. 20 or 30 feet long.
Q. Continues the whole length?
A. Yes, continues.
Q. And how with reference to the hanging wall?
A. Right on the hanging wall.
Q. Now, at the point 7 F, you say that there is a cross-cut running along the shale; did you say?
A. Yes; or along the clay seam.
Q. What did you find in the drift from 7 J to 7 H?
A. A smooth face with a thin seam of clay.
Q. A smooth face of what?
508 A. Of limestone facing into the vein or outside.
Q. On which side?
A. Facing in; I believe that [showing] to be the hanging wall of the vein, though I am not positive about it, though I think it is. It is where the hanging wall ought to be, because it is the first clay seam you find in going across the ledge.
Q. Well, that limestone had a smooth face as you approached it?
A. A smooth face; yes.
Q. What did you say about clay being on it?
A. A smooth seam of clay on the wall.
Q. Did you believe it to be the hanging wall?
A. I believed it to be the hanging wall of the ledge.
Q. Well, is there any complication of the shale at this point?
A. None at that point; no.
Q. Well, now, go on down to the next level, down to the 8th level; describe the 8th level.
A. Eighty-four feet from the shaft the tunnel runs through quartzite and there it enters. After crossing it enters the limestone at 8 A, when the limestone is followed by the drift to the left. At 8 B is a winze, and around the winze some little ore. No ore in

the drift to speak of. There is a little bit near 8—, except the ore near 8 B, until you get near ——, there aint any at all in that level. It goes to the shale at 8 D. The winze is up there near 8 D.

Q. Well, does it pass on beyond the shale?

A. Yes; it goes beyond the shale.

Q. Well, what does it expose there?

A. It goes to a heavy shale at the end, near 7 L.

Q. No; near 8 something. It is on the 8th level.

509 A. Oh, yes; well, he has got the letter in the wrong place. Don't you see? [showing.]

Q. Well, that is so.

A. That don't belong to that level at all. I point to 7 L.

Q. Which ought to be 8 instead of 7?

A. Yes; there is a heavy shale comes in there; clay.

Q. Now, Mr. James, in there did you find any stratified limestone?

A. Yes, sir.

Q. Well, describe where you found it.

A. It is between 8 D and 7 L.

Q. Point out the place on the map.

A. Between 8 D and 7 L I found stratified limestone.

Q. Well, did you examine that stratified limestone and the shale and all those points about there very closely?

A. Yes.

Q. Well, is it your opinion or not, that that stratified limestone is in the lode or vein?

A. I don't think it is in the ledge.

Q. You don't think it is?

A. No.

Q. Why?

A. Because I find that behind the first clay seam which is discovered between the foot and the hanging wall of the ledge, it is possible it may be on the ledge; if it be so, then that clay seam must have joined on to this [showing].

Q. And taking a sharp angle like that?

A. Yes.

510 Q. The heavy clay seam must have come in that way and turned in that direction to have enclosed that stratified limestone?

A. Yes; it possibly may have done it.

Q. But you say you found this other seam, which you stated just now, more in a normal direction?

A. Yes.

Q. Mr. James, you have seen the shale here, as it is exposed in the 10th level of the Eureka Consolidated, and in the 8½ level of the Eureka Consolidated?

A. Yes.

Q. And up near the mouth of the Bell-shaft tunnel?

A. I have.
Q. Now, what is your idea of the continuity of that shale found at those points in the Richmond 7th and 8th level and the 10th level, and other points as described in the Eureka, and as found on the 2d and 3d level of the K. K?
A. I think they are the same shale.
Q. Why do you think so?
A. They have about the same dips, and are in the position you would expect to find them.
Q. They are found in the position you would expect to find them?
A. Yes.
Q. In mining, working under ground there. Well, how are their general characteristics? How does it appear as found at these different places?
A. Well, the appearance is very much the same, although that would not make so much difference, because most any clay seam looks like most any other clay seam, finding them in the position there.
Q. Well, it is thicker at some places than others, and very much thicker over there in the Richmond, isn't it?
511 A. O, yes, in this [showing], the main shale; it is very thin here, along that face.
Q. Mr. James, can you describe the 10th level of the Eureka Consolidated?
A. O, yes.
Q. And pursue it to the Richmond at the west?
A. The 10th level does not connect with the shaft, but commences at the bottom of the winze marked 9 V. The level there is in limestone, barren limestone, which continues some distance to the winze 30; 30 or 40 feet then from there, at the end of the drift, it penetrates the hanging wall of the ledge—the shale wall. There is a branch leaves the main goes to the left before reaching the end of the drift, some 20 feet from the end, which, after getting in some 40 or 50 feet along the branch of the exposed shale, from there ore nearly to the end of the drift.
Q. At what point?
A. At 10 E, from nearly the end of this branch, there is a connection runs to the Richmond, 60 feet down. That is all I have to say of the 10th level. From there you go into the Richmond works.
Q. Let me ask you a question before you leave that. In this 10th level, where it approaches the hanging wall, or reaches it at 10 C, and near 10 C, do you find any ore?
A. Yes, sir; what I supposed to be ore; what I think is ore.
Q. Now, in the drift from that level, running to the west, did you find any ore?
515 A. Yes.
Q. Called the main to the level on the maps?
A. Yes; I found a little ore along that drift, or little spots of ore.

Q. How close to the hanging wall or shale?

512 A. All the way along the wall where it was visible. Where the wall was visible, very close to the wall. I found some good ore at the point 10 D, and some galena right at the point 10 D.

Q. Now, after entering the works of the Richmond at that point, works run by the Rickmond, and told you to be the works of the Richmond, what did you find?

A. I found ore also all the way in that drift; all the way in the drift into the Richmond.

Q. At what points? State between what points.

A. Between 10 G and 6 J.

Q. 6 J being on the 6th level, I suppose, of the Richmond?

A. Of the Richmond.

Q. Did you follow along the 6th level, then, of the Richmond?

A. Yes, sir; through the 6th level went into the ore-chamber.

Q. To the 6th level ore-chamber?

A. Yes, sir.

Q. Now, then, between 6 J and 6 H what did you find?

A. I found what I thought was ore, from 6 J to 6 H, visible along the drift.

Q. From 6 H to 6 F, in what does the 6th level of the Richmond run?

A. It goes through barren limestone from 6 J to 6 F. It goes through limestone; barren limestone.

Q. On which side of the shale?

A. It goes to the north of the shale.

Q. Then from 6 F it would pass into the 6th level of the ore-chamber?

A. 6th level of the ore-chamber.

513 Q. Mr. James, did you go down in any of these winzes below the 6th level to the lower workings of the Richmond?

A. Yes; 60 feet down the winzes. I went down this winze [showing].

Q. Yes; either one of them?

A. I went down from the Richmond 6th level. There is a winze goes to the 7th level, and at 30 feet down connects with the Eureka 10th level. That is this same winze here [showing].

Q. Well, what did you find down that winze? Did you note?

A. I found ore down in the winze. I don't know that I found ore in the winze, but at the botom of it I did.

Q. Now, Mr. James, can you describe this drift marked 6 L on the map there?

A. Yes; that drift runs through what appears to be ore nearly to the end of the drift.

Q. To nearly the end of the drift?

A. To nearly the end of the drift.

Q. Somewhat broken or scattered towards the end of the drift, is it?

A. Yes.

Q. Now, what was that drift meeting in its course?

A. I was meeting with the drift marked 10 E.

Q. From what?

A. On the 9th level.

Q. From what level?

A. The 9th level of the Eureka.

Q. No.

A. Well, it is 160 feet below the 9th level.

Q. From the point that was coming to meet it from a point 160 feet below the 9th level?

A. Below the 9th level.

514 Q. Were you through the drift 10 E?

A. Yes, sir.

Q. What does it show?

A. That shows ore from the bottom of the chamber clear down to the bottom of the winze, and also the ends of the drift.

Q. Out to the end of the drift?

A. Yes, sir.

Q. As it goes along in that direction?

A. It goes down the wall a part of the way, and part of the way perpendicular.

Q. Down on the quartzite wall, is it?

A. Yes; goes down the wall part of the way, and part of the way perpendicular?

Q. Well, is the wall perpendicular.

A. Oh, no; you go perpendicular; you start above the wall and go down perpendicular until you strike it, and then follow it down to the drift; I think it was about 60 feet on the wall.

Q. Now, can you state the difference in the drift between the level 6 L and the drift 10 E?

A. I cannot.

Q. You don't know that?

A. No; I have not got a memorandum of it?

Q. Now, Mr. James, you have been in the Potts chamber?

A. Yes.

Q. Do you or do you not consider the Potts chamber a part of the same lode upon which these various levels are, and upon which these croppings in the Champion are?

A. I most certainly do.

Q. Well, give to the court your reasons for so thinking?

515 A. I think so because I find all of the works that Mr. Thornton mentioned between the two walls are what I call walls of an ore-bearing body of rock, and because I do not find that I know that I have not seen in that district any ore contiguous to

this ore-body ore-bearing rock that appears to have got outside of that ore-channel.

Q. Did you walk over the hill there—Ruby Hill—several times, Mr. James?

A. Yes, sir.

Q. Did you find any mine being worked on the quartzite to the south side of this Ruby Hill, the summit of Ruby Hill?

A. I did not.

Q. Did you see any hoisting works anywhere there?

A. No.

Q. Now, did you see any ore being extracted or mine being worked at any point in the limestone on the northerly side or northeasterly side, at any point?

A. I did not.

Q. At any point did you go into these openings, one in the Richmond and one in the Eureka Consolidated, into the quartzite from which some quartzite had been taken to work as flux?

A. Yes.

Q. Or which you were informed of?

A. Yes.

Q. What was the appearance in those openings of a continuation of this lode into the quartzite?

A. I did not see any lode continuing into the quartzite at that point.

Q. At either one of those points?

A. No.

Q. Well, if ore was taken out of those places from the
516 body of the quartzite, were there any remains left of the ore there, similar to the ore that you found in the vein?

A. There was in the quartzite redstone rock, that looked to me very much like the redstone rock that they call ore stains in the vein. I had some of that rock assayed, and I found it contained some silver.

Q. Some of that taken of the quartzite?

A. Yes, sir.

Q. Well, how much silver?

A. Oh, there was a return given to me of one dollar and a half to the ton.

Q. Well, was there anything like a bunch or body of ore in there?

A. Oh, no.

Q. Nothing?

A. No.

Q. There was just a red stain on the vein?

A. Yes; red-stained rock.

Q. Red-stained quartzite rock.

A. Yes.

Q. Now, Mr. James, did you ever go down the workings of the Jackson mine?

A. Yes.

Q. Did you see any shale in those workings?

A. I did.

Q. Well, any quartzite?

A. I saw the shale and quartzite.

Q. Well, how did they appear?

A. I saw the shale in the 300-foot level, also in the 360-foot level, 460-foot level, both.

Q. How near were they together at any point in the Jackson?

517 A. In the 460-foot level there is a winze goes down on the quartzite to a distance of ——. I have not noted the distance; but my recollection is, it is down about 100 feet, more or less. It follows the quartzite down 100 feet, more or less. Then it—from the bottom there is a drift runs 10 feet out into the——, until it cuts the shale, say about 12 feet from the bottom of the winze. Then there is a drift from that point running between the shale and quartzite, until it runs up into a point where they come together like that [showing].

Q. Well, now, Mr. James, in your observation of quartzite wall at every point in all these mines that you have mentioned, what is the appearance of the face of it?

A. It has a smooth, soft, clay-looking face.

Q. A smooth, soft; worn smooth do you mean?

A. Yes, sir.

Q. And with those same motions that you described some time ago?

A. Yes, sir.

Q. Up and down on the face of it?

A. Yes, sir.

Q. Did you watch for that particularly, to observe it?

A. I did.

Q. Now, can you describe generally, without looking at your book to be so particular about it, any ore-bodies in the Eureka or K. K. mines that were separate from the quartzite, not resting upon it or approaching it? Do you remember any such?

A. I don't remember now in the K. K. or the Eureka that was separate from the quartzite?

Q. That you saw?

A. No.

Q. Those that you observed were resting upon the quartzite?

518 A. Were upon the quartzite.

Q. Resting upon it?

A. Yes.

Q. In the body of the limestone in these mines did you see any

cross-breaks or limestone faces of great extent; in the K. K., for instance?

A. Well, yes. Not in the K. K. I saw in other portions some cross-breaks.

Q. Well, let me call your attention to the second level of the K. K.

A. Oh! I believe I did. I have got a memorandum of it here. I will look at it. [After looking in the book.] Yes, there is one of those cross-breaks, as you call them, northerly; there is a drift along this cross-break for 92 feet.

Q. A face?

A. Yes.

Q. Limestone face? To what point does it extend?

A. It extends—let me see—

Q. From the shaft to what point, or near the shaft?

A. [Looking at the map.] I will find that in a minute. It runs to the hanging wall.

Q. At the point marked what?

A. Marked 2 L, and it runs across 35 feet beyond.

Q. The drift does?

A. Yes.

Q. Now, does that face of limestone—that cleft of limestone—extend through that shale at that point?

A. No.

Q. And what is the thickness of the shale at that point?

A. I don't recollect the thickness of the shale, but it is not very thick. I have not got a note of the thickness.

Q. And the drift extended beyond the shale?

519. A. Thirty-five feet.

Q. Shows that this cross-break and immense face of the limestone does not pass beyond?

A. Does not.

Q. Did you see up that face of limestone? How high could you see it?

A. Only the height of the drift.

Q. And which direction was it facing?

A. I don't recollect which side of the face the drift was on.

Q. Mr. James, you say that you have been a surveyor in the Comstock mines for a number of years?

A. Yes.

Q. Are you familiar with the foot wall of that vein and with the contents of the veins?

A. Yes, sir.

Q. Did you observe any irregularities in the quartzite foot wall of this Eureka lode?

A. Irregularities in course; yes, and dip.

Q. In dip and direction?

A. Yes.

Q. Both in the dip or course, or streak?

A. Yes.

Q. How do those irregularities compare with those of the Comstock foot wall?

A. With the foot wall of the Comstock—much more abrupt than the foot wall of the Eureka.

Q. Much steeper depth?

A. I mean that the irregularities of the Eureka lode are much more abrupt than the irregularities in the foot wall of the Comstock lode.

Q. They are shorter, then?

A. Yes, sir.

520 Q. The curves and capes. Well, are these irregularities of any great size or not in the foot wall of the Comstock?

A. There are great irregularities in the course, but not violent changes of course.

Q. Well, they are more extensive?

A. Yes.

Q. Larger capes and promontories, then?

A. Yes.

Q. Which is the most prominent and marked which you have seen, or can now describe, in the foot wall of the Comstock?

A. The cape making out in the Imperial mine.

Q. What would be about the dimensions of that cape?

A. Well, it is a point you might describe as a point or a cape; the extreme point would have a curve of, as far as I know of this it would be, or rather the point would have a radius, it would be found by a radius of four or five hundred feet.

Q. Well, taking the general, a line showing the general direction of the foot wall, the cape would extend at its outermost point to what distance from that line?

A. From the line?

Q. Yes.

A. Well, four hundred feet, I think, about.

Q. Four hundred feet?

A. Yes, sir.

Q. Then you would say that was a cape or promontory bulging out into the ledge 400 feet?

A. Yes.

Q. From the line of the foot wall?

A. The line of the general course.

521 Q. In working the Comstock mine what is considered the general line of the lode to be followed for the purpose of prospecting and exploring; or what rocks?

A. You mean what rocks you follow?

Q. Yes.

A. Well, the usual designation of the rocks by the miners along

the Comstock is cyanite for the foot wall and porphyry and feldspar porphyry for the hanging wall.

Q. Now, in the deeper workings of the Comstock, upon what do their levels generally run; along what?

A. They run along the foot wall most generally in prospecting, because the ground stands better running along the foot wall than it does along the ledge. That is, they run nearer to the foot wall in prospecting, and running along exploring a drift, before any cross-cuts are made, they run nearer to the drift than the hanging wall.

Q. Then they cross-cut toward the hanging wall?

A. Then they cross-cut toward the hanging wall.

Q. Now, what is the irregularity of the hanging wall of the Comstock?

A. It is much more irregular than the foot wall, in fact it is a little more obscure or difficult to tell when you get to it than the foot wall. You don't know always when you do find a hanging wall of the Comstock.

Q. How does it compare in regularity with the apparent regularity of the shale hanging wall of this Eureka lode?

A. Not so easily determined when you find it.

Q. What was the greatest width at any point between the foot wall and the hanging wall of the Comstock?

A. About 800 or 900 feet.

522 Q. Can you describe the greatest irregularity that is now in your mind in the hanging wall of the Comstock?

A. In the hanging wall? I don't think I can, because the hanging wall is cut in so few places in the lower or deep levels. In the upper levels, probably, the greatest irregularity occurred in the Savage mine. There was the widest point that I know of in the upper workings of the Comstock lode. I think there it was about 800 feet wide.

Q. At the suggestion of Judge Mesick I will ask you one question. What is the minimum distance between those two walls at any one point?

A. I don't know of any point that is less than 300 feet.

Q. From your own observation?

A. Yes.

Q. What is the proportion in the Comstock lode of barren matter to pay-ore?

A. I don't think there is one per cent. of pay-ore in the Comstock.

Q. How will the proportion compare with the proportion in the Eureka lode?

A. So far as my observation goes the Eureka lode contains a greater proportion of pay-ore than the Comstock.

Q. Mr. James, why would you call that quartzite the foot wall of

a lode? Where does the word wall come from, or what does it mean, or foot wall?

A. I mean by it foot wall of the lode, the boundary beyond which there is no workable or pay-bodies of ore.

Q. Well, then, for the same reason, you would call the shale the hanging wall of the Eureka lode?

523 A. Yes; for the same reason.

Q. Because they are the apparent boundaries of the ore?

A. Yes.

Q. Are or are not walls generally looked for in a lode, by miners, in working them?

A. Yes; so far as I know.

Q. They are expected to be found, are they?

A. Yes.

Cross-examination by Mr. HILLHOUSE:

Q. Have you ever been engaged in countries where the country rock was limestone, in mining?

A. I have not.

Q. Have you ever examined any such districts except this one at Eureka?

A. I never did, except the mine at Unionville.

Q. Did you examine that district extensively, at all?

A. I did not examine the district; I examined a single mine.

Q. Have you examined any part of Eureka district, excepting this portion on Ruby Hill?

A. No other part.

Q. Did you follow, or attempt to follow, the quartzite southerly from the Jackson mine?

A. I did not.

Q. Is there any difference at all between these lines of contact, between the quartzite and the limestone and the limestone and the shale than the point of contact between any other and different formations throughout the country and mining country you have been?

A. No; not that I know of.

Q. Then those walls that you speak of, dividing the lime-

524 stone and quartzite, is simply a line of contact between two distinctive formations, is it not; and the shale the same?

A. Yes.

Q. Did you examine the country on towards the town from the line of shale? You drove over it, I suppose, going out?

A. I drove over it frequently, going back and forth.

Q. Didn't you notice there that there were other lines of shale along and lines of quartzite also between that and the town?

A. I noticed one other line of shale.

Q. That was, comparatively speaking, close to the other one?

A. Yes; close to the other one; yes; close to the ledge.

Q. Beyond the next belt of limestone, did you notice a quartzite belt?

A. I did not.

Q. You were not on Prospect mountain?

A. I was not.

Q. Suppose these lines of contact between these different formations should be 5,000 feet apart and the ore dispersed generally throughout the body that lay between them, would you still call that a vein?

A. I would, if the ore was not found outside of these lines of contact.

Q. Then I suppose the substance of your testimony is that the belt of country rock in which the ore is found constitutes the vein?

A. My view is that the belt of country which contains the ore and beyond which there is no ore is the vein. That is my idea of a vein.

525 Q. Let me suppose a case in Eureka district. Supposing on Prospect mountain, for instance, that the westerly base of the mountain was bounded by quartzite and the easterly base of the mountain by shale, and that it was from one to two miles and a half wide, and ore occurred throughout the whole mountain as it occurs on Ruby Hill, and limestone occurred similarly, broken up more or less, and stained with iron in other ores throughout its entire distance, would that be a vein in your opinion?

A. I don't believe I gather your——get a good idea of your supposition.

Q. Supposing the whole of Prospect mountain, for 3 miles long and a mile to two miles wide, had on either side, for instance, on the westerly side a belt of quartzite, on the easterly side a belt of shale, between those lay a large belt or zone of limestone in which the ore occurred in all sorts of shapes, from fissure-veins throughout all others named in the books, even more closely connected and more crowding than there is in proportion on Ruby Hill, would that be a vein in your opinion?

A. No; not at all; because if it was 3 or 4 miles wide, and in it were fissure-veins, I should call it fissure-veins.

Q. Leave out the fissure-veins.

A. Very well. If this were, as you suppose, 3 or 4 miles wide, and had well-defined boundaries or walls, and contained ore distributed throughout, it might be 10 miles wide, still I would call it a vein or lode.

Q. It would still be a vein?

A. Yes; I don't think the width has anything to do with the definition of the meaning.

526 Could you tell me how to locate such a vein under the act of Congress, when we can take but 300 feet on either side of the center of the vein.

A. No; I could not.

Q. Mr. James, does limestone or the country rock ever constitute vein matter?

A. It does in this case. Limestone, in this case, constitutes what I call vein matter.

Q. I any other case?

A. Yes; nearly always the vein has country rock in it.

Q. That is when it has broken in throughout the walls and forms horses?

A. Yes, sir.

Q. Are these horses between these walls, as the term is used by miners?

A. I don't think they are horses. I don't have any theory of my own concerning the formation of this vein. I only gather from what I have heard others say and what I have read.

Q. The only reason, as I understand you, why this is a vein is, that you find this ore disseminated more or less throughout this rock in various manners and forms, and that you find these walls dividing the different formations?

A. That is my reason, mainly, for thinking so. If I were working the mine and found the walls well defined, and beyond the walls found no ore-bodies, I wouldn't go to any books to find out what it was called. I would call it my vein.

Q. You would call it a vein, although you had never seen anything like it before?

A. I wouldn't care whether I had ever seen anything of the kind.

527 Q. No, you are trying to ascertain what it is; you would name it then?

A. I would name it; I would give it a name.

Q. Supposing these bodies of ore were disconnected each from the other throughout the zone, would it make any difference? In the zone, I am speaking of?

A. That is, there was no connection. If there were bodies of ore in the zone and not connected, you mean, would it make any difference?

Q. Would it make any difference, in your opinion?

A. No; but if there were bodies of ore in the zone and they broke through the zone and went outside of it, it would make a difference; then I might modify my opinion.

Q. Are you acquainted with the Reese River district?

A. No, sir.

Q. Then I believe we will suppose such a case that there is a belt of granite some mile or so in width, in which probably a hundred small veins occur, that granite is divided from other country rock by sharp lines of contact easily traced and so forth; would that all be one vein?

A. No.

Q. Why?

A. Because the veins in the granite are entirely different from these veins; each vein itself is really a vein in granite, I think.

Q. But each body of ore is not a separate body of ore on limestone?

A. Well, if you were to find a granite vein half that, the gangue is granite——

528 Q. Well, let us have an answer; each vein in granite is a vein of itself? Isn't, then, on the same reasoning, each body of ore separate in limestone a separate body of ore, whether a vein or what not?

A. No; I distinguish betweens veins and bodies.

Q. Well, I don't want any distinction between that just now; please answer.

A. Well, how can I answer without distinction?

Q. Is not each separate from the other as well as the vein in a belt of granite? If in this zone we find numbers of isolated bodies of ore, and in the granite zone numbers of veins of ore, wouldn't those be as much separate as a number of veins in the granite?

A. Oh, certainly not.

Q. Well, why not, Mr. James?

A. Now, let me tell you why. In this country, in this zone of ore-bearing rock, there are bodies of ore; each body is a body of ore in the vein. But if you suppose the country that has itself veins through it, I can distinguish between those veins and the bodies in the other case.

Q. Well, each body of ore is as separate from the other as in the other case?

A. Allow me to illustrate: as for example, the Virginia Consolidated and California mines are working a vein of ore in the Comstock lode.

Q. In the Comstock lode?

A. Yes.

Q. Well, we will come to the Comstock presently.

A. Now, I distinguish between that and the lode.

Q. Well, we will come to the Comstock presently. Then you would not consider them separate as long as they were in the same formation—that is, in this limestone belt?

A. I would not consider bodies of ore in a vein the same as veins in a body of rock.

529 Q. Mr. James, you are assuming the main question about which we are contending.

A. I am trying to get your idea.

Q. As to whether this is called a vein or not? then this is the first mine of this sort you ever examined in limestone.

A. Yes, or any other stone.

Q. You never saw anything like it?

A. I never saw a mine like this before.

Q. It bears no resemblance whatever to the Comstock, does it?

A. Very little.
Q. Any?
A. Some.
Q. In what?
A. In this: that it has walls well marked.
Q. In this: that it has walls. In any other?
A. No; it has no ores of the same kind in it, and no veins inside of the lode that are marked by walls.
Q. What are the walls on the Comstock? Of a fissure?
A. Walls of a fissure, I think.
Q. That is a fissure-vein?
A. A fissure-vein.
Q. These are walls simply marking the line of contact, are they not?
A. Yes.
Q. Then, Mr. James, if I understand you, this you consider a vein or lode, although different from any vein or lode you ever saw or ever read of?
A. Yes.
Q. How did you distinguish in going through that mine between the quartzite and the limestone, Mr. James?
530 A. I distinguished the difference by taking acid. I found quartzite would not effervesce, and the limestone would.
Q. Did you use acids throughout?
A. Yes.
Q. On each examination?
A. Yes; every point where I have mentioned quartzite I have used acid.
Q. Throughout the K. K. levels?
A. Yes, sir; because I was not acquainted with the rock, and I was not going to take anybody's word for it, and I used the acid.
Q. On the third level of the K. K. was there not limestone underlying the ore?
A. I think we did find some limestone there underlying the ore, and in another place also; but I don't recollect exactly where it was. At least we found ore at one point, at any rate.
Q. At one point you found ore touching the quartzite in the third level?
A. No, no. I guess I said something I did not mean to say.
Q. Well, excuse me, then.
A. I found some ore at one point on the outside of the hanging wall.
Q. Oh, I don't care about that. I have not got to the hanging wall yet. On the 3d level of the K. K. did you not find limestone between the ore and the quartzite in some number of places? You can tell from your book without looking at the map, probably.
A. [Looks at the book]. I don't think I have got any memorandum of it, and if I did find it I don't know it.

Q. You were looking for the quartzite underlying the ore particularly?

531 A. I did look for the quartzite particularly underlying the lode.

Q. And when you found that, you made a note of it?

A. Yes.

Q. And when you found the limestone underlying it, you made no note of it?

A. Well, I did not find any limestone underlying the quartzite, that I recollect of.

Q. No, no; underlying the ore.

A. Oh!

Q. Between the ore and the quartzite you found that frequently, I suppose.

A. Well, if I was looking for ore upon the quartzite, which I was frequently, to find ore in contact with the quartzite, and I tried it, and I found the ore was not in contact, I made no note af the ore; if I had occasion to note it, I did.

Q. Now, as to this hanging wall, so called, how long has the hanging wall of the Comstock been definitely ascertained?

A. At some points for a good while, and some points it is not now definitely ascertained.

Q. There is a great diversity of opinion even yet as to where the hanging wall of the Comstock is in a great many places, is there not?

A. There is. I doubt now if the superintendents of the mines along the Comstock, many of them, know where the hanging wall is, to-day, in the lower level?

Q. Why do you take this small belt of shale that is found in there, as the hanging wall of this vein, in preference to the layer-body immediately back of it, a few feet back of it?

532 A. Because, outside of this small belt of shale, no ore that I know of is formed that has paid to work.

Q. Comparatively speaking there has been no work outside of it, has there?

A. If there was ore there it would have been worked, and therefore I say there is no ore there.

Q. I say, comparatively speaking, there is no work outside of it, is there?

A. No, and I do not think there will be.

Q. It is only a matter of opinion, then, as to what they found?

A. That is my opinion.

Q. If these bodies of ore should run through it, you would be hunting for a hanging wall on this vein yet, would you not?

A. I would; if they run through it, I would be hunting for a hanging wall; but if I did not find any I should think I was entirely mistaken in my theory about it.

Q. If the hanging wall should disappear from that, would you consider this any less a vein?

A. Well, I don't know as I would—yes, I might—it might shake my opinion. I think it would. If the foot wall remained, however, I should still think that they had not got the hanging wall.

Q. Still, if the hanging wall was further out to the northeast or east—

A. Further out?

Q. If there were any ore found outside of that shale in some numbers of places, some distance from there, would you consider that it had any effect at all on this question of vein or no vein?

A. Well, it would depend upon the amount of ore. Now, every one of those bodies of ore that are followed down here—say,
533 that one where the Potts chamber is.

Q. I do not care about going down there now. On the surface, if there are a number of bodies of ore found on each side of this so-called zone throughout the district in a great many places, would it have any effect upon your opinion in relation to this being one vein?

A. Yes; it would have an effect. If bodies of ore were found on each side on the surface or any other place, it would have an effect on my opinion.

Q. If, then, in following this quartzite and shale belt to the southerly from the Jackson mine, there should be hundreds of mines located on either side and worked, and ore taken from out of this shale belt, how would that affect your opinion?

A. Well, I think it would change it a good deal.

Q. Would you not then think that these were deposits?

A. I should probably begin to think so.

Mr. Mesick.—Q. How is that?

A. If there were hundreds of mines being worked on the outside of this vein I should begin to change my opinion about it.

Mr. Hillhouse.—Q. I am on the east side of the shale belt going south now. You have never been down there to see, Mr. James, have you, whether such things exist?

A. I do not think they do exist, or I think I would have seen them.

Q. Now, I am going south from the Jackson on this shale belt.

A. Oh, I never went south of the Jackson any distance.

Q. You never went to look how the other portion of the country was there at all; you confined yourself particularly to this?

534 A. I confined myself particularly to this Ruby Hill.

Q. Don't you think it is necessary for a mining man, before rendering his opinion in reference to such a great vein as this, is to examine the surrounding country to some extent?

A. Well, I was informed that I had examined nearly everything that was known on Ruby Hill; I thought I had.

Q. Well, Prospect mountain is right close there, is it not?

A. It is not a great distance, but it is beyond.

Q. This is a spur of Prospect mountain, they all tell us.

A. I don't think that the same belt of ore-bearing limestone runs up Prospect mountain.

Q. You think not?

A. No, I think not.

Q. How do you know? What makes you think that it does not?

A. Well, I, like others, take a great deal on information when I have not time to examine the whole country. I was informed it did not run up there.

Q. Well, who told you so?

A. Mr. Keyes, Mr. Read.

Q. Then, Mr. Read told you that it did not run up there?

A. I understood him to say that Prospect mountain was on altogether a different belt of country.

Q. When did Mr. Read tell you so?

A. I don't recollect. Sometime in general conversation.

Q. Well, we will pass that. Suppose that belt of shale could be traced continuously from the Jackson mine, two miles southerly; walked up right along upon the surface, and hundreds of mines are located and worked, and are taken from them to the easterly of it; would that have any effect at all on you opinion?

535

A. Well, I should think, then, that there was a belt of ore-bearing country east of the shale.

Q. A belt of ore underneath the shale?

A. Yes, sir.

Q. Will you answer my question? Would it have any effect on your opinion as to this being one great vein? Yes or no.

A. Not that circumstance alone, because these suppositious mines might be on one side of the shale and these on the other, and still be a lode.

Q. Supposing, then, that the zone of limestone in which the ore occurs on the west of the belt of shale, is full of deposits and pockets of ore, and that on the east the same?

[After discussion on the propriety of putting questions involving suppositions, the cross-examination is proceeded with as follows:]

Q. Well, Mr. James, we will pass that. What in this vein, as you call it, do you call ore? What portion of it now? I want you to designate.

A. I call ore in the vein anything that would contain silver, gold, or lead.

Q. Anything which contains silver, gold, or lead?

A. Yes, sir.

Q. Does most of the iron in there contain some one or more of those in greater or less degree?

A. Yes, sir; so far as my knowledge goes. I have had samples assayed for my own information which did contain it.

Q. You have never had any acquaintance whatever with the ores, or such ores as are found there, until you went there?

536 A. Very little until I went there—very little.

Q. The wall of that vein of which you were speaking, does it face toward the vein or from it—the hanging wall?

A. Does it face toward the vein or from it?

Q. Yes; is the vein here [showing], and is that the wall, or is it a part of the bank, the wall?

A. The hanging wall? The vein is on that side [showing], under.

Q. Under it?

A. Yes.

Q. It is always so, isn't it?

A. Yes; or it wouldn't be a hanging wall.

Q. Did you examine the hanging wall of this vein in the Bell-shaft tunnel?

A. Yes.

Q. Is not that wall out the other way, just the reverse of what the hanging wall would be?

A. You mean leaning the other way? No.

Q. Not leaning the other way, but is not the smooth face presented out from the vein instead of in toward it?

A. Let me look at my memorandum. [Looks.] In the Bell-shaft tunnel the wall dips to the——

Q. [Interrupting]. Which way is the face? Which way does that face the wall?

A. What, the face of the wall?

Q. Yes.

A. What do you call the face of the wall?

Q. Well, if you walk along you face the wall in that tunnel?

A. Yes; that is the face you first see.

Q. That is the face of the wall?

A. That is the ledge you see going into the tunnel.

Q. That is west?

537 A. Yes; the wall from that is cut off. If you were on the other side, then the other side would be the face. Is that what you mean?

Q. Is there any smooth face on the other side at all?

A. You see a smooth face in the Bell-shaft tunnel; that is the one I am referring to, and that represents the face of the wall.

Q. That is the wall of the vein, you think?

A. That is what I take to be the face of the wall of the vein.

Q. Does that face towards the vein?

A. Upon my word, I can't understand what you mean. That face you see faces you as you go in.

Q. Certainly, and that is from the vein?

A. And you are looking towards the vein as you go into the tunnel?

Q. Then it is facing out from the vein?

A. Yes.

Q. The clay is lying on the smooth wall, instead of the vein lying under it there, is it not?

A. The clay is not there, because it has been taken off by the miners when they cleaned off the face.

Q. Not all of it?

A. Well, most of it?

Q. Is the Comstock foot wall all the same throughout?

A. No. There is different rock in different places; so I have been informed by men who are capable of judging.

Q. What is the difference, please?

A. I don't know; there is a mechanical difference to the eye, as I understand; but what the other differences are I cannot say.

Q. There is a general difference in appearance?

538 A. One is darker than the other.

Q. Does not the porphyry, as generally called there, form both walls of the vein at either end, northerly and southerly?

A. There is a difference in the porphyry at Virginia, but not so much difference in the appearance as at Gold Hill, though I believe some of these gentlemen who understand rocks make a difference.

Q. Well, I say, now, at either end of the vein, does not what is called porphyry form both walls of the vein?

A. Both walls everywhere, what is called porphyry.

Q. Both walls everywhere?

A. Yes; porphyry on both sides, but there are different kinds of porphyry on one side from that on the other.

Q. Well, the syenite forms the foot-wall along through the Virginia, does it not?

A. Yes, sir.

Q. Now, at either end, does not the rock called a porphyry form both walls?

A. Oh, yes; but syenite is also called porphyry.

Q. Syenite called porphyry, too?

A. It is called porphyry.

Q. Does not the syenite form the foot wall at the north and south wall of the Comstock, as far as it is floored?

A. I don't think you find the syenite down at the south end.

Q. Well, do you find it at the other?

A. Yes; I think you do most of the distance.

Q. What is the barren matter in the Comstock ledge, of which you spoke?

A. It is porphyry, generally; the hanging wall, fragments of the barren wall.

539 Q. There is a great deal of the quartzite that is barren, too, is not there?

A. Yes, sir; a large proportion of the quartz is barren. It is not altogether barren, but nearly so.

Q. What is the porphyry inside of the Comstock vein called?
A. Horses.
Q. Why is it so called?
A. Because it is a good name for it.
Q. That is the only reason you know?
A. That is reason enough. The miners call them horses because they are fragments of country rock.
Q. I say, do you know of any other reason than that it is a good name for it?
A. I don't know that it needs any other reason, because they are fragments of the country rock fallen into the vein, and the miners call them horses.

Re-direct examination by Mr. THORNTON:

Q. With reference to the Comstock, where are the Monte Christo, Lady Bryan, and Occidental mines?
A. They are not on the Comstock.
Q. With reference to that, where are they situated?
A. They are east of it.
Q. How far from it?
A. From one to three miles.
Q. In what course do they run with reference to the Comstock?
A. Well, generally speaking, parallel with it.
Q. If the east wall of the Comstock has not been found in the explorations and workings there, and there are veins bear-
540 ing ore on the side of it, what does the existence of these veins show? Would they make any difference, in your opinion, as to the Comstock being a vein?
A. None whatever.
Q. As to the identity of it?
A. No; no difference, according to my opinion.
Q. If there were such veins outside of this, at some distance from this, would they change your opinion as to the identity of this lode?
A. Oh, no.

Re-cross examination by Mr. HILLHOUSE:

Q. Is there not a dispute amongst miners and mining men as to whether those claims named are on the Comstock or not, at this time?
A. Not that I know.
Q. Don't you know that the men working them or owning them claim them to be on the Comstock, at this time?
A. I don't think they do; I never heard that they did.
Q. Haven't they heretofore?
A. I don't know what they might have done.

[Here the further hearing of the case is continued until half-past 10 o'clock A. M., Monday morning.]

541 SIXTH DAY.

MONDAY, *July* 30, 1877.

Mr. Thornton.—If the court please, in reference to the entry and ouster in the ejectment case, it is understood that we will not go into proof of that, but that the defendant worked over this line in the Potts chamber, and the other workings in the 6th level, which are on our claim-side of the line within the last six or eight months.

Mr. Wren.—About eight months.

Justice Field.—Were the defendants in possession at the time of the commencement of the action?

Mr. Wren.—Yes, sir.

Justice Field.—Defendants, then, admit they were in possession at the time of the commencement of the suit.

Mr. Wren.—Were in possession of a portion, and were in possession of that portion that is charged in their complaint. You will admit, also, you are in possession?

Mr. Thornton.—Oh! yes, sir.

Mr. Wren.—It is also understood that the plaintiffs entered upon and were in possession of a portion of the premises described in our cross-action at the time of the commencement of this action.

Mr. Thornton.—Our respective workings show it here. Now I will recall Mr. Read.

THOMAS J. READ, recalled for plaintiff, examined.

Mr. Thornton.—Q. Mr. Read, is the model set up right now, in the proper direction?

A. Yes, sir; it is.

542 Q. Have you made any additions to the model since you testified before?

A. I have.

Q. Point them out and state what they are, as near as you can.

A. A small ore-chamber on plate 1. Change of the foot wall and ore-chamber on plate 5.

Q. Why was that change made?

A. The developments showed there was a change. The developments made from the 5th to the 6th level, shown on plate 6. The developments made below the 9th level on plate 7. Change of the foot wall on plate 12 and plate 13. Change of the hanging wall on plate 14, 15, and 16.

Q. Is that model now a true, correct representation of what it purports to represent, Mr. Read?

A. It is.

Q. Made from actual survey?

A. Made from actual survey. The ore-chambers, it was impossible for me to survey them; but I took that from the best information I could get.

Q. [Showing paper to witness.] Who made that tracing that you hold in your hand?

A. I made it.

Q. From what?

A. From a map in the clerk's office at Eureka, Nevada.

Q. In the county clerk's office?

A. In the clerk's office.

Q. Do you know who made the original map from which it was made?

A. I believe Mr. Westcoat made the original map from which it made.

543 Mr. Wren.—I object to what the gentleman believes, unless he knows something about it of his own personal knowledge.

Mr. Thornton.—Q. Did you ever hear Mr. Westcoat state that he made it?

A. I did not.

Q. You were not present at the time of taking the testimony on the former trial?

A. I was not; I was excluded.

Cross-examination:

By Mr. Wren.—Q. What scale is that model?

A. 100 feet to the inch.

Q. There is an ore-body shown on plate 5, there, of great extent. Is that on the Richmond?

A. There is no ore-body shown there.

Q. Plate 6?

A. Plate 6.

Q. That is on the Eureka?

A. That is the dividing line between the Eureka and the Richmond.

Q. What ore-body does that represent?

A. From the 5th down to near the 9th.

Q. From the 5th Richmond?

A. From the 5th of the Eureka.

Q. From the 5th of the Eureka down to near the 9th, is there any ore-body shown by any workings on the line between the Eureka and the Richmond, of that extent?

A. There are no developments upon the line but what comes between the plates, as projected upon the plate nearest to it; for instance, anything 50 or 60 feet from the plate is projected on that plate, the plates being taken at 100 feet apart.

544 Q. Then ore-bodies that appear on those plates would not be cut—some of the ore-bodies that appear on those plates would not be cut by a cross-section running at the point those cross-sections on those plates run?

A. They would not, but they would be shown upon the nearest plate.

Q. Where is the ore-body that is shown on plate 6?

A. The ore-body is developed from the workings of the Eureka Consolidated, at the end of the 5th, 6th, 7th, 8th, and 9th levels.

Q. Did I ask you what scale that model is upon?

A. You did.

Q. 500 feet to the inch?

A. 100 feet to the inch.

Q. What is the width of the ore-body shown on plate 6, as delineated on the map?

A. From the foot wall up, about 20 feet.

Q. Is there an ore-body extending for that length along what you call the foot wall, 20 feet in width?

A. From the developments made I think the ore-body is wider, but the developments do not develop it that distance, because there is only a narrow winze going down on the foot wall. In some places they run upon the ore. I found it to be even wider than represented in the model, in a poor or low-grade ore.

Q. What is the thickness?

A. As represented upon the model, about 20 feet.

Q. When you speak of the winze, you mean thickness?

A. Yes, sir.

Q. Then there is an ore-body running all the way up there, that you should think, from the developments that have been made, is 20 feet in thickness?

A. I should, sir.

[Here plaintiff rests.]

545 N. WESTCOAT, called for defendant, sworn, and examined by—

Mr. Wren.—Q. What is your profession?

A. I am a surveyor and mining engineer.

Q. How long have you been at work in your profession?

A. In this country, about 24 years.

Q. Have you been engaged in the survey of mines during that time?

A. About 20 years in the survey of mines, and every other kind or class of surveying; mostly mining surveying.

Q. How long have you been engaged in surveying mines in Nevada?

A. Since 1863.

Q. Has that been your exclusive business?

A. Yes, sir.

Q. In what districts have you been engaged in your profession?

A. In Virginia City, White Pine, Pioche, Eureka, and several other districts.

Q. Have you any acquaintance with limestone districts?

A. My first acquaintance with limestone districts was in White Pine, in 1868.

Q. Where you engaged in the survey of mines in that district?

A. I was.

Q. For what length of time?

A. Three or four years.

Q. You made the survey for the Richmond in this case?

A. I did.

546 Q. You were also the surveyor of the Richmond in the former case that was tried between these two companies, were you not?

A. I was.

Q. For what length of time?

A. Three or four years.

Q. Did you make the map there? [Pointing.] I suppose we had better mark that as an exhibit. Call it surface map of the Richmond.

A. It is marked surface map.

Q. You made the surveys from which that map is made?

A. I did.

Q. How long were you engaged in making those surveys?

A. I have been engaged in this last case in surveying about four months?

Q. I mean in making this survey for the surface map?

A. About a month and a half.

Q. Are the various points noted on that map correctly laid down from actual survey?

A. They are, sir.

Q. The names of the various mining claims are given in the locations that are delineated?

A. The name is marked on ordinarily near the center of the locations.

Q. What do the black markings or shadings represent?

A. They represent the limestone mountains, the contour, as near as may be.

Q. What color do you call this? [Pointing.]

A. That is chrome or yellow.

Q. What are the chrome-colored markings intended to represent on the map?

547 A. They represent the shale as found on the surface.

Q. The Richmond shaft is marked Richmond shaft on the map?

A. Yes, sir.

Q. The Lookout shaft is marked Lookout?

A. Marked Lookout shaft.

Q. The Bell shaft is marked Bell shaft?

A. Marked Bell shaft.

Q. The Utah shaft is marked Utah shaft?

A. Yes, sir.

Q. Bell-shaft tunnel is marked mouth of the Bell-shaft tunnel?

A. Yes, sir.

Q. Utah tunnel is marked mouth of Utah tunnel—Utah-shaft tunnel?

A. Utah-shaft tunnel.

Q. The top of the Tip-Top incline is marked Tip-Top incline?

A. Yes, sir.

Q. And the top of the Richmond incline?

A. Yes, sir.

Q. The shaft known as the Iron shaft, or "Virginia shaft," is marked Iron shaft?

A. Marked Iron shaft on that map.

Q. What is the point marked "7?"

A. The holes of shafts which they sank to a depth of a few feet are not delineated by any name, but they are all shafts less than ten feet deep. I have the notes and can explain any shafts that you wish to refer to, but they are not marked on the map as shafts. They are simply holes dug in the surface of the earth.

Q. What is the point marked "ore excavation?"

548 A. That represents an ore excavation on the surface, near the mouth of the Champion tunnel.

Q. What is the point marked waste dump?

A. That is the waste dump from rock, I suppose, coming from the tunnel and from the different excavations in that locality.

Q. What is the marking in red marked "quartzite?"

A. That is the quartzite.

Q. That line gives the line of the quartzite so far as there was room on the map to give it adjacent to these claims?

A. Yes, sir. It shows the contact for nearly the entire length of the map. The line marked contact is where the quartzite and limestone comes together.

Q. Did you examine those surveys delineated on the map with any care, Mr. Westcoat?

A. I surveyed the most of those claims into hundred-foot sections, and into ten-foot sections, and one of them into five-foot sections.

Q. Well, sir, what kind of an examination did you make of each section?

A. I passed over it, and I examined the surface as to what was in it; what was in sight, and where the rock was in place, and there was nothing over it where it was covered by dumps or debris, anything other than such material, and I so marked it. That was the object of marking those dumps.

Q. Did you make a note of your observations?

A. I did.

Q. Can you state, from your notes, at what points any ore croppings are found on the surface and what their extent is?

A. I can.

Q. Do so.

549 A. I will have to come over there. I cannot tell from this place. [Goes to the map.] The ore crops out at the Tip-Top and Richmond incline. It appears there are excavations at this line marked ore excavations ——

Q. Please speak a little louder.

A. [Pointing.] There is an excavation there, at the point marked ore excavation on the map for a distance of nearly 300 feet.

Q. We cannot hear you.

A. There is an excavation from which ore has been taken. At least there is ore remaining in spots at least on the sides of the excavation. [Shows on the map.] It is marked ore excavation, and extends a distance on the surface of some 250 or 300 feet.

Q. Is there any ore found on the surface in a line between the top of the Tip-Top incline and the ore excavation, marked ore excavation?

A. I am not able to find any.

Q. You say you examined every 10 feet of the surface carefully?

A. I did. I found in places in the limestone iron stains along the road from the Tip-Top.

Q. I am asking you about a line between the top of the Tip-Top incline and this ore-chamber, not a 100 feet off of that line.

A. I have not been able to find any.

Q. What do you find between the top of the Tip-Top incline and the ore excavation?

A. I find limestone.

Q. Is it to all appearance entirely barren?

A. It is.

Q. Now, sir, you may state any points at which you find
550 ore off of the line between those two croppings. You were going on to say something about finding something along the road.

A. About 200 feet south of the Tip-Top incline, along the road, I find a point in the upper side of the road that is iron stained, and from which I understood that there were samples taken for assays—iron stains—I should not call it ore; also there was colored matter in the Iron shaft

Q. Well, let us take one at a time. What is the extent of the iron stains that you find at this point along the road [showing]?

A. 2 or 3 feet in diameter.

Q. Well, sir; you found ore at the Iron shaft; you found colored at the Iron shaft?

A. Yes, sir.

Q. Have you ever seen any galena there?

A. I never did.

Q. There is some irony-looking ore that has been taken out of the top of that shaft and apparently lies there by that shaft.

A. You find material of that character lying at the top. I don't know where it came from.

Q. What is the extent of the colored limestone that you find at the Iron shaft at present?

A. Well, it is the extent of the shaft; about 4 by 6 feet.

Q. What is the depth of the shaft?

A. About 20 feet deep.

Q. Does it extend to the bottom of the shaft?

A. I was not in the shaft, and there was no way to get down it; no ladder nor rope. The colored matter appeared to extend down near the bottom; I couldn't see distinctly. It was some loose matter in the bottom. Whether it extended to the bottom or not I do not know.

551 Q. Well, sir, did you find ore at any other point on or near the Richmond claim, or anything that had the appearance of ore?

A. There was a hole on section 15. These claims are laid off into hundred-foot sections, and are numbered 1, 2, 3, 4, 5, 6, 7, 8, as sections are numbered on townships in government surveys. On the southwesterly section, which is numbered 15, I find a hole four feet deep, which has some colored matter in it, similar to that in the Iron shaft. About six inches thick.

Q. Did you find any at any other point?

A. I did not.

Q. This stained matter that you found in section 15 was about six inches thick?

A. Six inches thick.

Q. About what was its length?

A. Three or four feet—the hole.

Q. Well, sir, what did you find on the Lookout claim?

A. I found nothing that had the appearance of ore, or even stains of iron.

Q. On that claim?

A. No, sir. O, at the Lookout? I thought you referred to the Lookout shaft.

Q. No; the Lookout claim.

A. There is no sections one and two, near the line; there are three or four places, small spots, a few inches in extent, that appear to be iron colored, iron stained.

Q. What did you find on the Champion, in addition to the ore-chamber, that you have already described?

A. I think the ore-chambers were quite up to the line, excepting what was exposed in the ore-chamber by this excavation.

552 Q. Well, sir, did you find any other croppings on the hillside, on either hillside, on the southwest side of Ruby Hill, or on the northeast side of Ruby Hill; and if so, what were their extent? Just go on and describe them as rapidly as you can.

A. On section 3 of the Atlas location there are two holes marked

on the section, five or six feet deep, showing stained lime, darkish in color; I could not say whether they were iron stains or not; darkish colored lime, in a hole about 40 or 50 feet south of section 7. There is also another hole, which has stained lime—no stains of ore. That, I believe, is all I found, but where the lime appeared to be natural.

Q. On the southwest side of the hill?

A. That is on the southwest side of the hill.

Q. What was all the balance of the hillside?

A. The southwest?

Q. Yes.

A. Limestone.

Q. Above the quartzite?

A. Above the quartzite to the summit.

Q. Well, sir, you examined the northeast side of the hill?

A. I did.

Q. What is the great mass of the rock on the northeast side of the hill?

A. Limestone.

Q. Do you know where what has been called a clay seam runs through the Bell-shaft tunnel?

A. I know the seam and locality.

Q. Have you made a careful examination of the limestone from that clay seam over to the quartzite, and from that clay seam to the shale, for the purpose of ascertaining whether there was any difference between them or not?

553 A. I have.

Q. What was the result of your examination?

A. I could not detect any difference between the limestone on the east of the clay seam and that on the west of it. The clay seam does not come to the surface. It is exposed in the tunnels 25 or 30 feet from the mouth.

Q. What kind of an examination did you make?

A. Of the clay seam?

Q. No, no; of the surface limestone, in order to determine whether there was any difference between them or not?

A. I made no chemical examination.

Q. Well, I don't know what kind you didn't make, but what kind did you make?

A. Well, I made an examination simply by passing over the surface, examining the surface carefully, and examining the different qualities of limestone by the eye—general appearance.

Q. Well, sir; was any one along with you, and did they break off the limestone in order to ascertain whether there was any difference or not?

A. Yes, sir; several different times.

Q. Had a sledge-hammer and pick, and broke the limestone with them, did they?

A. Yes, sir; and put in blasts.
Q. A large number of places?
A. Yes, sir.
Q. Some hundreds or more?
A. Yes, sir.
Q. Did you make any examination in what is called the Ruby Hill tunnel?
A. I did.
Q. What is the length of that tunnel?
554 A. About 250 or 350 feet, I think; about 250 or 350.
Q. You don't recollect that exactly?
A. I do not.
Q. Did you examine first the Lizette tunnel lying to the N.E. of the clay seam, or what they call the clay seam, and the Ruby Hill tunnel on the same day and in the same hour?
A. On the same day, one immediately after the other.
Q. Did you endeavor to ascertain whether there was any difference between the rock found in the Ruby Hill tunnel and that found in the Lizette tunnel, or not?
A. In no way, except by hammer and general appearance.
Q. Well, you had a hammer along?
A. Yes, sir.
Q. And broke off the rock and examined it carefully?
A. I did.
Q. What was the result of your examination?
A. I could not detect any difference; but, as a generale rule, you can find pieces of limestone anywhere within a foot or two on the hill that do not resemble each other at all; that are entirely different. As a general rule there is no difference between the limestone in the Ruby Hill and that in the Lizette.
Q. You find limestone in both tunnels joined together; one portion perfectly black and the other nearly white, don't you?
A. Yes, sir.
Q. How many different varieties of limestone do you
555 think you find in passing over the surface of that hill and through the underground workings of the mines?
A. At least half a dozen.
Q. What is the difference of appearance between the quartzite and the so-called clay seam and the limestone that lies to the northeast of the clay seam?
A. I could detect no difference but in a general way. You could find limestone on each side, that is different materially; but as a general thing it is about the same, there is no difference.
Q. I am speaking of stratification now. The limestone is stratified on either side?
A. No, sir.
Q. As a general rule?
A. Not stratified at all on the surface.

Q. Is there any appearance of stratification, either in the Ruby Hill tunnel or in the Lizette tunnel?

A. There is not.

Q. Do you know where the Skylark shaft is situated?

A. Yes, sir.

Q. Is that on the northeast or southwest side of where the clay seam would run, if extended?

A. Northeast.

Q. Did you examine the shaft that is sunk between the Lawton shaft and the Skylark shaft?

A. No, sir; it only comes to the shafts that are delineated on the map.

Q. Did you examine a shaft sunk on what is called the Cliff mine?

A. I did.

Q. What did you find in that shaft?

A. Limestone.

Q. What is the color of it? Did you find anything else?

556 A. Darkish limestone. There are two inclines.

Q. I speak of the incline in the ravine now. Refer to your notes, and see whether you find any iron there.

A. I found nothing but limestone in either one.

Q. What is the distance between the croppings of the northwest end of the ore-chamber on the Champion, and the croppings of the Richmond lode at and near the top of the Tip-Top incline?

A. That is about 600 feet.

Q. And that entire distance is barren limestone?

Q. Yes, sir; with the exceptions that I have made.

Q. Did you make this map upon the wall, marked "Exhibit 1?"

A. I did.

Q. What portion of that map was made from actual surveys made by yourself?

A. It was all made from actual surveys by myself, except a portion of the K. K. mine. That I took from Mr. Read's map.

Q. A portion of the K. K. was made by yourself?

A. Yes, sir.

Q. What do the feathery delineations upon the map denote?

A. The summit of Ruby Hill.

Q. What does the point marked "Summit" denote?

A. It denotes the summit of that point.

Q. What does the point marked "L" denote?

A. The summit of that point.

Q. What does the point marked "M" denote?

A. The summit of that point; "N" denotes the summit of that point; "Q" denotes the summit of that point; and "V" denotes the summit of that point.

557 Q. The point marked "Tip-Top incline" denotes the top of that incline?

A. That denotes the top of that incline.

Q. What does the delineation marked "Richmond Old Workings" denote?

A. It denotes the old working of the Richmond some two or three years ago.

Q. Where ore has been stoped out?

A. Yes, sir.

Q. What does the delineation marked "Limestone incline" denote?

A. It denotes an incline sunk in the limestone.

Q. What does the delineation marked "cave ground" denote?

A. It denotes a large cave over what has been an ore stope.

Q. That ore had been stoped out underneath the ground marked "cave ground?"

A. It had.

Q. And it caved in because the ore stopings were not sufficiently secured?

A. Yes, sir; because the timbers were not sufficiently strong.

Q. What does the delineation marked "Lizette tunnel" denote?

A. It denotes the Lizette tunnel, on a level with the top of the Richmond shaft.

Q. What does the tunnel marked "Lizette level" denote?

A. The extension of the tunnel.

Q. What is denoted by "the Rossiter incline?"

A. It is an incline sunk from that level, from the Lizette level.

Q. What does the "ore-body" connecting the Lizette level apparently denote?

558 A. It is marked "ore-body No. 10." It is an excavation from which ore has been taken, I presume. There is ore on its sides.

Q. It is an old stope in the mine?

A. Yes, sir.

Q. What does the delineation marked "flat chamber" denote?

A. That represents the chamber developed by the Rossiter incline, and known as the "flat chamber," from which bodies of ore have been taken.

Q. What does the delineation "24" represent?

A. It represents the winze from the flat chamber to the second level of the Richmond mine.

Q. What does the lines marked "second level" represent?

A. They represent the second level of the Richmond mine.

Q. What does the delineation marked "23" represent?

A. The winze connecting the 2d with the 3d level of the Richmond.

Q. What does the delineation "45" represent?

A. It represents the winze, commencing 24 feet above the 3d level, and extending to the 4th.

Q. What is designated by the lines marked 3d level?

A. The 3d level of the Richmond mine.

Q. What by the delineation marked "cave ground between the 2d and 5th level?"

A. It represents the caved ground between those levels, containing ore stopes, I presume. This has all been timbered, and those timbers are broken down.

Q. A cave has occurred, owing to the decay of the timbers or the insufficiency of the timbers?

A. Yes, sir.

559 Q. What is marked 4th level?

A. That delineates the 4th level of the Richmond mine, 400 feet below the top of the shaft.

Q. What is marked 5th level?

A. That denotes the 5th level of the mine.

Q. What is marked Potts chamber?

A. That is the chamber developed by the 5th level, and extending down nearly to the 6th—an ore-chamber.

Q. What is marked 6th level?

A. That denotes the 6th level of the mine.

Q. What is marked "ore-chamber above 600 level?"

A. That is the chamber above the 6th level.

Q. What is marked "ore developed by drift, from 66 to 77?"

A. That is the ore-body developed by a drift run from the 6th level, and appears by drifts, but not taken out; simply developed.

Q. What is marked "ore-chamber, 600-feet level?"

A. That is the ore-body shown on the 6th level of the Richmond mine.

Q. What is marked "ore between 6th and 7th level?"

A. That is the ore-body extending down from the 6th to the 7th level.

Q. And what is "ore-chamber 700-foot level?"

A. That is the ore-body on the 7th level.

Q. The 700-foot level is marked 7th level?

A. Yes, sir; and 800-foot level is marked 8th level; and the 900-foot level is marked 9th level.

Q. Each level has a different color designating it?

A. Yes, sir.

Q. So that when you ascertain the color of any one level, you can follow that level by simply following the color throughout the map?

560 A. Yes, sir.

Q. What do the red dotted lines denote?

A. Quartzite; contact of the quartzite with limestone.

Q. What do the dark brown lines denote?

A. The brown lines denote the fissures and walls.

Q. The walls of fissures and fissures?

A. Yes, sir. Each is designated in the note, under the head of explanation.

Q. The color in which each mine is marked is explained by this note at the bottom of this map?

A. Yes, sir; the red dotted line is marked "quartzite."

Q. What line is this marked "road?"

A. That is the road extending from the Eureka to the top of the Tip-Top incline, or the Richmond mine, for the purpose of hauling ore.

Q. What is shown by the delineation marked "36 feet above Lawton tunnel," in the At Last?

A. It is a tunnel 36 feet above the Lawton tunnel, extending from a point above the Lawton tunnel to a winze connecting with the Lizette tunnel.

Q. What is the delineation marked "Champion tunnel?"

A. That is a tunnel entering the ground near this ore excavation in the Champion, connecting with the winze to the Lizette tunnel.

Q. What is the delineation marked "winze between 5 and 6."

A. That is the winze extending from the level of the Champion tunnel to the level of this drift, marked "36 feet above Lawton tunnel," and connecting with the winze that goes down to the Lizette tunnel.

561 Q. What delineation is it that is marked "winze at A and R," on the line between the Lookout and At Last?

A. That is a winze connecting the Lizette tunnel with this drift 36 feet above the Champion and the Lawton tunnel.

Q. What is the irregular body that is marked at that point?

A. The ore along the winze. That irregular body is intended to designate the ore.

Q. There is a small amount of ore that has been stoped out at point 5, between the Champion tunnel and the level connecting it with the level 36 feet above the Lawton level?

A. Yes, sir; and between 5 and 6 there is ore along the winze.

Q. What is delineated at the points marked "ore-chambers 11 and 12?"

A. That represents ore developed by the 5th level of the Eureka, in the Margaret ground; and ore about the extent designated on the map. They are numbered 58, 59, and 60.

Q. What is delineated at 58, 59, and 60?

A. A winze connecting the 5th level with the 6th level of the Eureka, in the Margaret ground.

Q. And the Eureka levels are marked 1st, 2d, 3d, 4th, 5th, 6th, 7th, 8th, 9th, and 10th, on the map?

A. Yes, sir.

Q. Is the K. K. marked in the same way?

A. The K. K. is marked first, second, third, fourth, fifth, sixth.

Q. Each figure designating the level of that name?

A. Yes, sir.

Q. And that is intended to include all of the cross-cuts that have been run from the various levels?

562 A. All that were open, and that were not filled at that time I made the survey, represented in the map.

Q. The level is intended to include all cross-cuts, as well as the regular level?

A. Yes, sir.

Q. Can each one of the levels of the Eureka Consolidated be distinguished by its color?

A. Yes, sir.

Q. Each one is a different color?

A. Yes, sir.

Q. And when you once find what the color of a level is, you can follow the level by simply following that color?

A. Yes, sir.

Q. Is it the same with respect to the K. K?

A. Yes, sir; it is the same in respect to the K. K.

Q. The different points marked are chambers, ore, and stopes, on that portion of the map including the Eureka Consolidated and the K. K., and are intended to represent old stopes where the ore has been stoped out, and as the bodies of ore appear at the present time?

A. All that I could find, either old or new stopes, have been delineated in that way and marked ore-chambers.

Q. And the caves that are found are delineated on the map and marked "caves," are they, when they are of any extent?

A. Yes, sir.

Q. The model is an exact representation of this map, isn't it?

A. The plates of the model were made from the map, on the same scale.

Q. So that each level is shown on the model precisely as it is shown on the map?

563 A. It is.

Q. And the relative heights of one level above the other is also shown on the model?

A. It is, sir.

Q. What is the scale upon which the model is built?

A. 40 feet to the inch.

Q. What are the vertical plates colored red, running from the top of the Tip-Top incline down to the lowest workings of the Richmond mine, intend to show?

A. They represent bodies of ore extending down into the line; from the Tip-Top to the 8th level.

Q. They show the Richmond ore and ore-stopes from the surface down to the lower working, do they?

A. Yes, sir; except in places where the ground has been caved, there it is represented by the word cave; by glass marked in a wavy form, and marked cave.

Q. Those caves are above the old ore, I suppose; and have been caused by the timbers giving away?

A. I presume that is the case.

Q. The vertical plates of glass that are marked in black represent the different shifts and winzes that have been sunk in the several mines shown by the model, don't they?

A. Yes, sir; and the depth.

Q. The Richmond shaft is marked "Richmond shaft" on the surface?

A. Yes, sir.

Q. And the Lawton shaft is marked "Lawton shaft" on the surface?

A. Yes, sir.

Q. And the K. K. shaft is marked?

A. I don't know what it is; because we have not that on the surface there.

564 Q. Please mark K. K. on there, so that it can be distinguished without trouble?

A. It starts at the point marked one, and I will mark it K. K.

Q. It also shows the depth to which the Lawton shaft and the K K. shaft have been sunk?

A. Yes, sir; the K. K. and the Lawton shafts have been sunk to the depth of the 9th level, connecting with the 10th level by a drift and a winze. The bottom of the K. K. terminates at the 6th level, so far as my examination went; I believe it has been extended down to the 7th; but I have not been down that far.

Q. The red lines on the model show the line of the quartzite; the contact between the quartzite and the limestone?

A. Yes, sir; the red dotted line.

Q. And the blue lines show what?

A. They show the contact between the shale and the limestone.

Judge Sawyer.—Q. Is there a red dotted line on each level?

A. Yes, sir; wherever the quartzite appears. For instance: on the 7th level the dotted lines terminate, and there the quartzite leaves the development. And where it comes in again it is marked at also the 8th. On the 8th level of the Eureka, at a point "89 B" on the 8th, and on the 7th level at the point "77."

Q. Where the dotted red line appears, it is intended to mark the supposed course of the quartzite from the developments made, is it?

A. Yes, sir.

Q. And where the red lines cross any of the levels or cross-cuts that are shown on the model, it shows where the levels or cross-cuts cut through the quartzite?

A. Yes, sir.

565 Q. Where the quartzite crosses it?

A. Yes, sir; where the developments have been made, exposing that contact.

Q. What are the blue lines intended to represent?

A. The contact between the shale or clay and limestone.

Q. Both the clay and shale and limestone?

A. Yes, sir.

Q. What are the brown lines intended to represent?

A. The walls or fissured planes.

Q. You have one color there that is intended to represent fissures filled with ore; what is that?

A. That is a brown line, and is marked "fissures containing ore;" but it also shows walls where the ore has been taken off; it was intended to show fissures containing ore, or where it has been.

Q. What is the green line intended to represent that runs around the surface of all of the model?

A. That is intended to represent a level line commencing at the top of the Lawton shaft, and following around the hill. It follows around the hill to the point "Y," and there it rises up over the hill; this hill is connected to Prospect mountain by a neck, and this neck is higher than the back of the shaft.

Q. This plate running to the southeast designates the summit?

A. Yes, sir.

Q. The vertical plates placed atop of the top plate of the model are intended to represent the surface of the hill from the level of the Lawton shaft upwards?

A. Yes, sir; and to show the summit and slope connecting with Prospect mountain off in a southwest direction.

566 Q. By inserting vertical places between the horizontal plates, the dip of either of the ore-bodies or the quartzite or the shale may be shown where they are found; that is in one level, either above or below the other?

A. Yes, sir; where there has been a winze running from one to the other, exposing the same.

Q. What are the vertical plates at the northwest end of the Eureka company's mines, dipping into the Richmond, intended to represent, on and above the 5th level of the Eureka?

A. It is intended to represent the ore-body dipping to the west or northwest.

Q. Standing at what would represent the northwest corner of the model, and looking directly down through the plates of glass to the northeast, it can be seen whether there are any ore-bodies contained in the zone, dipping in that direction?

A. Yes, sir.

Q. How is the dividing line between the Richmond company's mines and the Eureka company's mines designated on the upper plate, on the surface?

A. By a double line extending from R to W, and from W to X, and the disputed ground is east of point X, and immediately below a perpendicular dropped from point X.

Judge Hilyer.—Q. You do not mean that a perpendicular dropped from the point X will go through the ore in dispute?

A. No, sir.

Mr. Wren.—What does photograph No. 3 represent?

A. It represents northeast and east side of the hill.

567 Q. What point does figure 4 on that photograph designate?

A. The southeast side of Ruby Hill. Figure 6 represents the Lookout shaft; figure 8 represents the Bell shaft; figure 16 represents the Skylark; figure 15 the Lawton shaft; figure 17 the K. K.

Q. What does photograph No. 4 represent?

A. The southwest side of Ruby Hill.

Q. What does figure 1 on that photograph designate?

A. I don't recognize that point.

Q. What does photograph No. 1 represent?

A. The northeast side of Ruby Hill. Figure 2 on that photograph represents the face of the Richmond. Figure 3 represents the blacksmith shop. Figure 6 represents the Lookout dump. Figure 8 represents the Bell-shaft excavation. Figure 9 represents the Bell-shaft tunnel. Figure 10 represents the Utah tunnel. Figure 11 represents the mouth of the Ruby Hill tunnel. Figure 12 represents the railroad cut. Figure 13 represents the trestle-work of the railroad bridge. Figure 14 represents a house standing on the shale, and near the line of contact. Figure 15 represents the Lawton-shaft dump. Figure 16 represents the Skylark shaft and hoisting house. Figure 17 is the smoke-stack of the K. K. Figure 18 represents one of the peaks on Prospect mountain. Figure 20 represents the wagon road near the road to the Richmond shaft. Figure 21 represents the dump of some shaft; I don't recognize the shaft. Figure 22 represents a shaft or dump, but I don't know the name of it.

Q. What does the photograph No. 2 show?

A. Ruby Hill, the northeast side, and a little more to the
568 north. Figure 19 represents either Prospect mountain or the mountain west of it. I think it is Prospect mountain.

Q. The figures that appear on this photograph mark the same points as upon the last one?

A. Yes, sir.

Q. There are not as many on this; but such points as are marked, are marked with the same figures as are marked on number 1. Don't you recognize this [figure 4] as the excavation of the Champion mine?

A. Figure 3 represents the excavation of the Champion company near the mouth of the Champion tunnel. Figure 4 represents the excavation near the Windsail shaft. Figure 5 represents the Windsail shaft. Figure 6 represents the excavation easterly of the Windsail shaft. Figure 1 represents what may be a wall at the end of the Tip-Top incline.

[Here the court takes a recess until 2 o'clock P. M.]

AFTERNOON SESSION.

MONDAY, *July* 23*d*, 1877.

N. WESTCOAT, direct examination—Continued.

Mr. Wren.—Q. Mr. Westcoat, what winze is designated as 58 on defendant's Exhibit No. 1?

A. The winze extending down from ore-chamber No. 12 on the Eureka 5th level, and connecting with the 6th level of the Eureka.

Q. Connecting at the point marked 69?

A. Connecting with that point 69. 69 D.

Q. What delineation is it marked between 69 and 65 G?

A. It is the winze extending from the 6th level to a point about half-way to the 7th, in the Eureka works.

569 Q. And what is marked from 79 G to 79 E?

A. A winze from a point about half-way between 6 and 7, to the 7th level.

Q. What is shown from 79 D to 79 H?

A. A winze starting at the 7th level of the Eureka, connecting with the Richmond works about fifty feet above the Richmond 4th.

Q. What is shown from the point marked 57, on the 5th level of the Eureka, to the point marked 79 J?

A. It is a winze connecting the 5th level of the Eureka with the 6th level of the Eureka, in a cave, marked "cave."

Q. What is shown by the black lines from 79 J to 79 A?

A. A winze connecting the 6th level of the Eureka with the 7th level of the Eureka.

Q. And what from 79 A to 89 C?

A. A winze connecting the 7th level of the Eureka with the 8th level of the Eureka.

Q. And from 79 F to the delineation marked "cave," from the 8th to the 9th level?

A. A winze connecting the 8th level with said cave.

Q. What is the point marked "cave," from the 8th to the 9th? What is represented by the point marked "cave," from the 8th to the 9th level?

A. It is a cave commencing above the 9th level and extending up to the 8th, to within about 20 feet of the 8th level. A drift on the same level.

Q. Is it a natural cave?

A. It is; a natural cave.

Q. A natural cave?

A. Yes, sir.

570 Q. What is the point marked "ore-chamber," near the northwest end of Eureka 9th level?

A. It is an ore-chamber developed by the workings of the 9th level, at the point marked 99 and 94.

Q. What is represented by the drift running northeast from the ore-chamber, and northwest in the Eureka 9th level?

A. A drift running through limestone and designated as the Burleigh drill drift.

Q. What is the point marked 99 intended to represent?

A. A perpendicular shaft extending about 50 feet perpendicularly.

Q. What is the point marked 94 intended to represent?

A. That is intended to represent a perpendicular shaft starting about 50 feet below on the fifth level and extending 100 feet or more perpendicularly.

Q. What is the delineation running to the northwest from that shaft intended to represent?

A. It represents a winze from the bottom of the shaft, a drift from the bottom of the winze.

Q. What is the delineation marked "ore-chamber H" on the model intended to represent?

A. It is an excavation——

Mr. Justice Field.—[Interrupting.] Have you got in evidence the patents of the mines where these workings are?

Mr. Thornton.—They are in with the other patents of the defendant. They are attached to the bill.

Mr. Wren.—We will put them in now if you would like to look at them.

571 Mr. Justice Field.—We understand that those patents were issued under the law of 1872. Do you claim that they give you the rights of the laws of 1866?

Mr. Wren.—The claims were located under the laws of 1866, and the patent was issued under both laws.

Mr. Garber.—Application was made after the passage of the law of 1872.

Mr. Justice Field.—The claim is for the benefit of both laws, of 1876 and 1872?

Mr. Wren.—Yes, sir. We offer in evidence the patent of the Richmond Mining Company to the Richmond lode.

Mr. Wilson.—The law of 1872 gives the parties the rights which they were entitled to have under the law of 1866, and adds to their rights those that were ingrafted under the law of 1866. Therefore, the patent recites both laws.

Mr. Wren.—The patent may be marked exhibit No. 2.

Mr. Justice Field.—You had better put it "defendant's exhibit."

Mr. Wren.—What, sir?

Mr. Justice Field.—Better put it "defendant's exhibit."

Mr. Wren.—Yes, sir; mark it "defendant's exhibit, No. 2." We will give your honors the patents for inspection now, and subsequently we will give you a copy of them.

Mr. Justice Field.—I simply wish to see the patent at the present time, to ascertain whether it was within the surface of the patents that the Tip-Top croppings give.

Mr. Wren.—No, sir; within the surface of the Richmond. That is, right near the line of the Tip-Top.

572 Mr. Justice Field.—You have marked it on the map as within the lines of the Tip-Top.

Mr. Wren.—I think it will not appear so by the mark on our map.

Mr. Justice Sawyer.—Which is the older, the Richmond or the Eureka?

Mr. Wren.—There is no such location in the Eureka.

Mr. Justice Sawyer.—What is the order in which they are recorded?

Mr. Wren.—The Champion, square location, so called, is prior in point of time, I believe. I do not know anything for certain in relation to it. But I believe it is prior in point of time to the Richmond. The Richmond location, I believe, is prior in point of time to the Champion lode location. I believe that the At Last and the Margaret were never located as lead locations; though I cannot say certainly in regard to that. That is simply my memory with respect to it, as it is with regard to the Richmond and Champion.

Mr. Justice Field.—I simply wished to know what was the nature of the patent, and what it covered at this point. I did not know that there would be any legal question in this case. I thought it was going to be all a question of fact. It is possible that there may be important legal questions involved, as it now appears.

Mr. Wren.—There are many important questions of law to be determined in this case. I think, really, the questions of law will be more important than the questions of fact.

Mr. Justice Field.— I simply wanted to see the patents that I might look at the statute to-night, in connection with them.

573 Mr. Wren.—We also offer in evidence the patents to the Lookout and Tip-Top. We pass them up.

Mr. Justice Field.—Had you not better keep the original patents yourselves, and give us copies?

Mr. Wren.—We will furnish you copies to-morrow. You can take the originals to-day.

Mr. Thornton.—You have printed copies.

Mr. Wren.—They are not here to-day.

Mr. Justice Field.—You say that the croppings came out in the Richmond? That is not denied.

Mr. Wren.—The croppings appear in the Richmond.

Mr. Williams.—We will give you printed copies in the morning.

Mr. Justice Field.—You had better keep the original copies.

Mr. Wren.—Mr. Thornton has the kindness to loan me copies, as he has them. I did not think we had any here. We were not aware that we had any printed copies here. We have copies now. Mr. Thornton has just loaned them to me, which were attached to the affidavits served by me on him. All three. There are all three, I believe.

Mr. Thornton.—I will state that in these printed copies there is only misdate of the time of entry. In the printed copy which Mr.

Wren had made and served on us there is a misdate of the time of entry. The patent upon its face reads when the ground was entered; and the original patent reads that it was entered on a certain day in 1873. The printed copy says that it was entered upon a certain day in 1872. I will correct them.

Mr. Williams.—Let us get the exact date for the patent. Take the patent and look at it before you pass it up.

574 Mr. Thornton.—Now it is correct.

Mr. Wren.—Is Mr. Read in the room?

[No answer]

Mr. Thornton.—I think both maps show correctly the locations, surfaces, mines, ores, and drifts.

Mr. Wren.—Precisely. It is admitted that the surface lines of the claims as delineated on the model and the map are the correct surface lines described in the patents.

Mr. Thornton.—Yes, that is so.

Mr. Justice Field.—The two maps do not differ in that respect?

Mr. Wren.—No, sir.

Mr. Thornton.—Mr. Wren says they are expressed correctly by the maps.

Mr. Wren.—Yes. The plaintiff's maps, and also the model, show the surface lines correctly, as described in the patents. What does the delineation on the surface plate, the delineation marked "ore-chamber H," on the surface plate represent, Mr. Westcoat?

A. It represents an ore excavation from the surface, from 5 to 20 feet deep, near the mouth of the Champion tunnel.

Q. And on the Champion plane?

A. And on the Champion plane, and extends over right to the Buckeye, a little.

Q. What does the delineation marked "ore chamber at surface," represent?

A. It delineates a large ore-chamber commencing at the surface and extending from a few feet to 20 or 30 feet deep, of the size and shape delineated on the model.

Q. Did I understand you to say, Mr. Westcoat, that the
575 line between the ore-chamber marked ore-chamber H, on the surface plate of the model to the croppings, at the dip of the Tip-Top incline, you found nothing but barren limestone?

A. Nothing, sir.

Q. What did you find in the level marked 36 feet above the Lawton tunnel; between the points B and the point Z on the model?

A. I found nothing but limestone.

Q. Is it barren limestone, or has it any of the characteristics of the lode?

A. Between those points it has no characteristics of the lode.

Q. What did you find between the point Z and the Windsail shaft, as delineated on the second plate of the model?

A. A portion of the distance between Z, nearest to the Windsail

shaft, is limbered up, and has the appearance that ore had been excavated from it. A portion of it is colored lime. It has the appearance of ore matter.

Q. What is the next level of the Eureka Consolidated below the level, 30 feet above the Lawton tunnel? To what point on this model does that level come?

A. The Lawton-tunnel level is marked in black.

Q. What is the second level of the Eureka Consolidated, marked M?

A. It is marked in yellow or crome.

Q. That level does not extend to the northwest for a very great distance?

A. Three or four hundred feet is all.

Q. Are there any developments running out at all near the same elevation from the Richmond towards the second level of the Eureka Consolidated that shows what kind of ground there is in there?

576 A. There are not.

Q. There is a space about what length left between the northwest end of the second level of the Eureka and the workings of the Richmond?

A. 600 or 700 feet.

Q. In what color is the third level of the Eureka Consolidated marked on the model?

A. It is marked in red, light red.

Q. What distance is there between the end of the third level of the Eureka and the northwest end of the third level of the Eureka and the southeast end of any workings of the Richmond, by or near the same level?

A. I will have to measure it. If I had a scale here I could measure it. I did have a scale here, but I do not see it now. It is about 350 feet.

Q. Are there any workings between the northwest end of the third level of the Eureka and the southeast end of any workings of the Richmond that shows the character of the ground in the space between?

[No answer.] What did I understand you, as to that question?

A. There is nothing that shows the country in that locality.

Q. In what color is the 4th level of the Eureka marked on the map?

A. It is in green.

Q. Light green?

A. Light green.

Q. How far is it from the northwest end of the 4th level of the Eureka, to the northeast workings, to the northeast, from the Richmond lode?

A. About 500 feet.

Q. Are there any workings between those points to show what the character of the country is, at or about that level?

577 A. There are not.

Q In what color is the 5th level of the Eureka marked on the model?

A. It is marked in blue.

Q. What is there between the point marked 54 and the point marked 55, on the 5th level of the Eureka Consolidated?

A. I have no note here to describe the thing in particular, any more than its general drift is in limestone.

Q. What is found between point 55 and the Bell shaft in the Eureka 5th level?

A. Limestone, wherever I have examined it. It is situated on the contact, and much of it is timbered.

Q. You found no ore between those points on the 5th level?

A. No, sir.

Q. In what color is the 6th level of the Eureka Consolidated delineated?

A. It is delineated in black or dark brown.

Q. What distance is it between the northwest end of the Eureka 6th level and the point?

A. The extent of the level and drift is run in the northwest end of the Margaret claim of the Eureka Consolidated.

A. About 500 feet.

Q. Are there any workings to show the character of the rock between the northwest end of the Eureka 6th level running from the Lawton shaft and the levels and drifts that correspond in height to the 6th, in the northwest end of the Champion claim of the Eureka Consolidated?

A. None that I have ever examined; I think there is none there.

Q. What color is the 7th level of the Eureka Consolidated delineated in?

578 A. Umber—light brown.

Q. What do you find between the point marked 75 and the point marked 76 of the 6th level of the Eureka Consolidated?

A. A drift all lined, mostly all timbered, to point 76.

Q. What do you find from point 76 on the Eureka 7th level to point 79?

A A fissure-plane part of the way, between limestone and lime; we find a plane without anything between the limestone and quartzite, down to 78.

Q. What do you mean by a fissure-plane?

A. Two smooth surfaces coming together or separated indefinitely, sometimes having the marks of movement.

Q. Sometimes having the marks of movement and sometimes not?

A. Yes, sir.

Q. Is there anything contained between the quartzite and the limestone?

A. Nothing.

Q. Cannot you tell from your map where the point 78 is? There is no such point marked on the map at all. There are but few numbers on the map?

A. Do you mean the point where the winze goes down to the 8th level?

Q. That is the point there [pointing].

A. Oh, yes, sir. That is point 78.

Q. Well, that is not at the point of contact between the quartzite and limestone, then, is it?

A. That fissure [pointing].

Q. That fissure-plane you speak of is not at a point between the contact and the limestone?

579 A. No; it leaves the contact and passes through the winze. I think it connects; I think it joins the contact.

Q. It joins the contact to the southeast or the northwest of the winze?

A. Yes, sir.

Q. Well, which?

A. To the southeast.

Q. It joins the contact to the southeast of the winze?

A. Yes, sir.

Q. What did you find along the plane or contact, between the quartzite and the limestone from 76 to the cross-cut that runs out to the winze at 78?

A. I found nothing but a close contact between the two formations.

Q. Was there any appearance of a fissure there?

A. On the line of contact!

Q. On the line of contact between the quartzite and limestone?

A. Well, the line of separation you can distinguish there very easily. Whether there are any marks of movement or not I do not recollect, as I have not got it noted.

Q. What do you find between the southwest end of cross-cut that runs to winze 78 and the point marked 79, on the 7th level of the Eureka Consolidated?

A. The point of contact between the quartzite and limestone to 79, the point where parties now are at work? It was at that time that I took the notes on March 23d. They were then at work there.

Q. In 79?

A. Yes, sir.

Q. Did you find any ore or appearance of ore between those two points?

580 A. I do not, sir.

Q. What did you find between point 79 and 79 A, on the 7th level of the Eureka Consolidated?

A. It is all limestone out to 79 B.

Q. There are two branches of the tunnel, one to 79 B and from 79 A. What is it on the branch running to 79 A?

A. From branch 79 A is on contact; to 79 B is on limestone.

Q. Did you find any appearances of ore between the line of contact between these two points?

A. Nothing until you come to 79 B. There we found a little branch of ore in a drift. It was probably three or four feet in diameter at the time we saw it.

Q. In what color is the 8th level of the Eureka Consolidated delineated?

A. In light red.

Q. What do you find between the points marked 88 on the 8th level of the Eureka Consolidated, to the point marked 89?

A. Limestone.

Q. What was your answer to that?

A. Limestone.

Q. Do you find any ore or appearances of ore between these points on the 8th level?

A. I do not.

Q. What do you find between the points marked 89 and 89 B, on the 8th level?

A. Between those two points I find nothing but contact; the contact comes in between those two points. I find nothing but contact and limestone.

Q. What do you find between the points 89 B on the 8th level and the point 89 C?

A. Contact, quartzite, and limestone.

581 Q. Is there any ore or appearances of ore between those two points?

A. None, sir.

Q. What color is the Eureka 9th level delineated in?

A. Black.

Q. What do you find upon the Eureka 9th level, from Lawton shaft to 99 E?

A. Limestone and quartzite.

Q. Do you find any ore there?

A. No, sir.

Q. Or appearances of ore?

A. No, sir.

Q. In what cross-cut from the 9th level of the Eureka Consolidated does the water come in?

A. It comes in, in this long cross-cut here, not numbered or named, which the quartzite cuts in an ox-bow shape.

Q. Are you sure about that cross-cut, that the water comes in at it?

A. That is the water. Yes, sir. There is lots of water comes in there. The water comes in there, and the water comes in there. [Pointing.]

Q. The water comes in at all three of those cross-cuts?

A. Yes, sir. The main water comes into this cross-cut, at the junction here. [Pointing.]

Q. The water comes in at all three of those cross-cuts?

A. Yes, sir. The main water comes into this cross-cut, at the junction here. [Pointing.]

Q. The water comes in at the cross-cut marked what?

582 A. The cross-cut nearest to the Lawton shaft is marked 99 R; the next one, the short one, is marked 99 A; and the long one, where the quartzite crosses it, is marked 99 W.

Q. What was the last one?

A. 99 W.

Q. What do you find in cross-cut 99 W.

A. Quartzite for about 70 or 80 feet; and then limestone to the end.

Q. Any ore?

A. No, sir.

Q. Is there any appearance of ore there?

A. I saw none.

Mr. Justice Sawyer.—Is that dotted line the line of the quartzite?

The Witness.—That is it. Yes, sir.

Mr. Justice Sawyer.—Mr. Wren, do you claim that the dip of the lead differs from the dip of the quartzite wall?

Mr. Wren.—Yes, sir. We claim that the quartzite is not a wall at all.

Mr. Wren.—Q. What is found between this point 99 E and the cross-cut 95 on the 9th level of the Eureka Consolidated?

A. Limestone, until we come to the drift which is marked 95, to the junction. Between that drift and the cross-cut main drift, which is ore-matter to the end, there is a difference of 25 or 30 feet. At the end, at winze up, we find ore.

Q. What color is the 10th level of the Eureka Consolidated marked in on the map?

A. That is also marked in black.

Q. Are there any workings to the southeast from the cross-cut marked tenth level of the Eureka?

A. None in that level.

583 Q. Is there shown, in all of these workings from the surface down, running in about the same direction that the dip of the Richmond runs and the Eureka lode runs, a barren zone of limestone shown on the surface and throughout the workings of those claims?

A. There is.

Q. What is the width of that zone after passing the Champion ore-body of the Eureka? About the width of it, as shown by those workings? Just give an approximate estimate of it.

A. About 600 feet.

Q. Which is the lowest—the lowest workings of the K. K. and Eureka Consolidated, or the lowest workings of the Richmond mining claim?

A. The Richmond is several hundred feet the lowest.

Q. How much lower are the workings in the Richmond mining claim than the lowest workings of the Eureka Consolidated?

A. 270 feet.

Q. How much lower are the workings of the Richmond than the lowest workings of the K. K. mine?

A. About 450 feet.

Q. I will ask you now whether the Richmond is a dry mine or not?

A. I never have found any water in it at all.

Q. In what direction does the water run that is found in the cross-cuts in the Eureka that you have described? Where does it run?

A. That water from the tenth level of the Eureka runs over right to the Richmond?

Q. I am speaking of the cross-cuts that you described here—these three cross-cuts?

A. They all run towards the Lawton shaft of the Eureka mine.

Q. It don't sink into the limestone, but runs along the levels, do they, to the Lawton shaft?

584 A. Yes, sir.

Q. What becomes of the water that is found in the end of the 6th level of the Richmond, and in the 10th level of the Eureka?

A. I don't know; it disappears.

Q. It sinks, don't it?

A. It sinks.

Q. Then, the water that is struck on the 10th level of the Eureka Consolidated, and in the 6th and 7th levels of the Richmond, sinks, while that that strikes at a higher point in the Eureka Consolidated runs to the Lawton shaft? And what is the disposition of it there?

A. Hoisted up, probably.

Q. You have seen it hoisted up?

A. Yes, sir. I presume it is hoisted up, all of it.

Q. From what you have observed in the workings from the surface down, between the ore-bodies of the Richmond and the ore-bodies of the Eureka Mining Company, and from the fact that the ore-bodies found on the 10th level of the Eureka and the 6th level of the Richmond, sinks, and the water found on the 9th level of the Eureka, in the cross-cuts, does not sink, but has to be hoisted up, what conclusion do you draw from that as to the body of rock contained between the ore-bodies of those two mines?

A. It would rather prove that there is no fissure connection; nothing that watar would naturally follow; no connection of material that water would naturally follow.

Q. What would it tend to prove in regard to the solidity of the rock between the different ore-bodies?

A. It would prove that the rock was impervious to water.

585 Q. Would it or would it not prove that the rock has not been broken up and opened to any considerable extent?

A. It would prove that there was a barrier that would stop the water.

Q. What do you find at the point marked "Richmond incline" at the surface, in the model?

A. I find an ore-body coming to the surface.

Q. What depth can you pass along that ore-body or along the stopes from which ore has been taken in the Richmond mine?

A. About 1,700 feet.

Q. Are there any fissures disclosed in pasing down that distance from the surface in the Richmond mine?

A. The fissure disclosed on the second level in the winze from the second to the third, a winze from the third to the fourth, and along the third level, into a cave which exposes a fissure twenty or thirty feet high, and about the same length in the cave.

Q. Are there any other fissures disclosed lower down or higher up?

A. There are other fissures disclosed in the fourth, down towards the fifth, and at different points from the fifth to the sixth, and, I think, from the sixth to the seventh. And from the sixth to the seventh we follow the fissure all the way; from the seventh to the eighth all the way; and part of the way from the sixth to the seventh.

Q. What is the appearance of the fissure or fissures that are exposed by the workings on the Richmond lode?

A. They are mostly smooth, and, right where they have been deepest, show signs of motion.

Q. They are striated, are they, or are they not?

586 A. In places they are striated; more places are smooth.

Q. From the continuous ore-body that you find on the surface at the head of the Richmond and Tip-Top inclines down to the lowest workings of the Richmond, and from the fact of finding these fissures, and from the form of the ore-body, what name would you give that body of ore?

A. It is a vein described by some writers as a segregation or pipe-vein.

Q. What is the general form of the vein; regular or irregular?

A. It is irregular; in places the ore is twenty, thirty, or forty feet thick, and in other places it is but a few inches. In some places it extends laterally for fifty or sixty feet, and in other places for two or three hundred.

Q. It answers to the definition of what is described in some scientific works as a pipe-vein?

A. Yes, sir.

Q. What is your opinion with regard to the ore-bodies that are found descending into the earth from the croppings of the Buckeye through the various works of the Eureka and the K. K?

A. The croppings of the Buckeye I have not been able to trace down to any extent, to any depth. Neither have I been able to connect any ore-bodies over any number of levels in the Eureka. In the K. K. I have in two or three levels, but in the Eureka, from caving, or from destruction of some kind, I have not been able to trace the ore-body for any distance.

Q. What is the impression made upon your mind with regard to those ore-bodies by the tracing you have been able to do?

587 A. I don't think they extend to any depth. I don't think they continue.

Q. Do you think they are connected, or not?

A. I think they are not. I have no evidence of their connection.

Q. What is your opinion about the ore-body exposed at the Champion, at the surface? Do you think that that is connected with any of the other ore-bodies, or not?

A. I think not. I could not trace it.

Q. What is your opinion about the ore-bodies exposed by the workings in the Margaret location, at and near the fifth level of the Eureka Consolidated? Are they, in your judgment, connected with any of the other ore-bodies in the Eureka mines, or not?

A. I think not. I saw no evidence to support that theory.

Q. What are your reasons for believing that the ore-bodies at the 5th in the Eureka, and below, for a short distance, are not connected with any other ore-bodies in the Eureka location?

A. Well, I find developments that show that they are connected.

Q. What do you find, so far as developments have gone, between that ore-body and the ore-body in the Champion, at the surface?

A. Well, there is over one hundred feet between them that there have been no developments in, to show whether they do or do not connect.

Q. What are your reasons for believing that the ore-bodies at the 5th, in the Eureka, and below, for a short distance, are not connected with any other ore-bodies in the Eureka locations?

A. Well, I find no development that shows that they are connected.

588 Q. What do you find, so far as developments have gone, between that ore-body and the ore-body in the Champion, at the surface.

A. Well, there are several hundred feet between them; there have been no developments to show whether they do or do not connect.

Q. The Eureka level, 36 feet above the Lawton level, is between them, is it not?

A. That is between them; yes.

Q. Well, sir; does that show that they are or are not probably connected?

A. Nothing on that level shows that.

Q. Is there anything to show that they are not connected?

A. Well, there is no development showing that they are connected. There might be ore on that level 36 feet above the Lawton tunnel; but finding the dip and the strike different and no development to show they are connected, there would be no evidence to predicate that they did connect. That ore-body on the surface near the Champion has neither dip nor strike to it. It appears to be an irregular mass of ore on the surface, and you cannot trace it anywhere, while the ore in the 5th level of the Eureka has a regular dip and strike.

Q. What is the dip and strike of the ore on the 5th level of the Eureka?

A. The last development is south about 20° west, and dips from 40 to 50 to the north.

Q. From 40 to 50 what; degrees?

A. Degrees; yes, sir.

Q. What is the dip of the ore-body at the northwest end of the Eureka 9th level?

A. It dips to the N. E.

589 Q. That would be at right angles with the dips of the ore-body of the Eureka 5th, would it not?

A. Yes, sir; about.

Q. What is your opinion about the probability of an ore connection between the ore-body shown at the N. W. end of the Eureka 9th and the ore exposed in the workings and for a short distance below the 5th level of the Eureka?

A. Well, the dip and strike is so different that it is impossible to state whether they are connected or not; they have got to change materially to connect.

Q. Have you examined the winzes running up from the ore-body in the N. W. end of the Eureka 9th towards the 5th level of the Eureka?

A. I have.

Q. Have you made notes of your examination?

A. Yes, sir.

Q. Will you come over here to the map and tell me just what you found there? [Witness steps back to map on the back wall of the court-room.] What did you find in the winze from the cave above the ore-body at the N. W. end of the Eureka 9th level and the 8th level of the Eureka? Take your notes and let us have it exactly what you found.

A. What level is that?

Q. From the cave up to the Eureka 8th?

A. About 60 feet from the 8th level is a winze down to the cave. On the line of contact between quartzite and lime I found no ore.

Q. Did you find any appearances indicating ore in that winze?

A. Not till I got down about to the cave.

Q. What did you find there?

A. There is some ore in the cave at different points
590 in the cave, at the side of the cave 60 feet; I found ore about 60 feet.

Q. From 89 J to 89 C on the 8th level of the Eureka Consolidated what did you find?

A. I found nothing but contact between the quartzite and lime; contact pretty close.

Q. In close contact?

A. Yes, sir.

Q. Did you find any ore?

A. I didn't, sir.

Q. Did you find any appearances of ore?

A. I did not.

Q. Is there ore in that district, owing to its peculiar color, easily distinguished from the country rock?

A. Very easily.

Q. Answer a little louder.

A. Very easily distinguished.

Q. From 89 C to 79 A, on the 7th level of the Eureka Consolidated, what did you find?

A. The distance between those two points is a winze connecting the two levels.

Mr. Thornton.—What are the points? Give them to me.

Mr. Wren.—89 C, 79 A.

A. 79 A.

Q. It is a winze. Well, sir, what did you find in that winze, between those two points?

A. I passed through the winze several times, generally on a rope, and at the time I passed through on a rope, there was so much mud and water that it was almost impossible to examine the country at or near the bottom of the winze. Within about 20 or 25 feet of the top of the winze, I saw one of these bunches of galena, which was all the ore that I have been able to find in that winze.

591 Q. How large were those bunches of galena?

A. The size of your fist; half the size; went within about 20 feet of the 7th level.

Q. Are small, isolated bunches of ore common in the vicinity of lodes in limestone districts, so far as your observation goes?

A. Frequently find them.

Q. What was the character of the contact between the limestone and the quartzite in that winze?

A. Where I could examine it carefully it was close, very close.

Q. Did it exhibit any evidences of a lode or vein?

A. It did not, sir.

Q. From the point 79 A to 79 J, through the winze from the 7th level of the Eureka Consolidated to the 6th level, what did you find?

A. That passes up the winze on the contact, mostly on the contact, between the quartzite and lime; but as a general thing the winze is driven in the quartzite, it being easier driven through the quartzite than in the lime.

Q. As a general thing, what?

A. The winze passing from the 7th to the 6th is driven on the contact; as a rule the most of it is on the contact, but there portions of it that are driven in the quartzite, the quartzite being the softer material, and for a number of feet together you cannot see the contact between the two formations; you cannot judge what it is?

Q. You cannot tell where the point of contact is? Well, sir; what did you find in that winze; any ore?

A. I found no ore; mostly quartzite, of a less crumbling nature.

Q. What?

592 A. Quartzite of a less crumbling nature; no ore, or appearance of ore.

Q. From 79 J to 57 through the winze, from the 5th level of the Eureka, to the 5th level, what did you find?

A. That winze passes on the contact between the quartzite and the limestone, excepting about 20 or 25 feet, where it passes through the cave; the cave being in the quartzite. The contact close to where we could find it, where we could examine it, no ore.

Q. Were there any appearance of ore in that winze?

A. I could not see any.

Q. From point 57 on the 5th level of the Eureka Consolidated, to the point 57½, what do you find?

A. Contact between the quartzite and lime.

Q. Any ore?

A. No ore till you get to 57½; there you will find ore.

Q. You find ore at 57½?

A. Yes, sir.

Q. Do you find ore in the winze from 57½ to the ore-chamber level?

A. I do.

Mr. Garber.—Q. Will you put your stick along that?

Mr. Wren.—I asked him if he found ore in 57½ in the winze to ore-chamber 11.

Mr. Garber.—I have got it now. I just wanted him to point it out on the map. [The witness does so.]

Mr. Wren.—Q. Through what does that winze run?

A. It is run, starting out on quartzite, it terminates in ore in the limestone. The ore leaves the quartzite; it starts on the quartzite, and it leaves the quartzite and terminates in the limestone.

593 Q. The ore starts in the quartzite and terminates in the limestone. What is the dip of the ore found in that winze?

A. About 45 or 50 to the north.

Q. Forty-five or 50 what to the north?

A. Forty-five or 50 degrees.

Q. Forty-five or 50 degrees what?

A. From 45 to 50 degrees from the horizon, all the time; that is, the dip from the horizon.

Q. Well, what is the direction of the dip?

A. North; the winze running about a north course, and that is on the dip.

Q What course does the quartzite run at the northwest end of the 5th level of the Eureka Consolidated?

A. It runs south, 20 west, or within a degree and a half within the compromise line.

Q. Just give me the course.

A. South, 20 west.

Q. What course does the quartzite run between 69 F and 69 D on the 6th level of the Eureka Consolidated?

A. It runs southeast, nearly east and northeast.

Mr. Wilson.—Q. What does he use, magnetic or true?

A. Magnetic.

Mr. Wren.—Q. You use the magnetic in all of your testimony in regard to the courses, do you?

A. Yes, sir.

Q. In what direction does the quartzite run between 79 D and 79 E on the 7th level of the Eureka Consolidated?

A. There is no drift runs there through the country. The course from the two points would be nearly west. But there is a part of the distance that you have to imagine the quartzite, as there is no drift run through.

594 Q. In what direction does the quartzite run between 89 E and 89½ on the 8th level of the Eureka Consolidated? I want the exact course now.

A. Well, there are several courses in there.

Q. Well, give me the average course. If you cannot give that, why, then, give the course between different points, intermediate between those points.

A. Well, the general course is northwest; it won't vary but a few degrees from the northwest, the general course.

Q. Speak louder.

A. The general course is northwest.

Q. What distance is it perpendicularly from the point 79 D on the 7th level of the Eureka Consolidated, and the point 89 D on the 8th level of the Eureka Consolidated?

A. One hundred feet.

Q. And what is the distance horizontally?

A. About eighty feet.

Q. And in that distance of eighty-nine feet perpendicularly and

eighty feet horizontally the quartzite turned almost directly at right angles?

A. Yes, sir.

Q. And what is the distance between the points 69 F on the 6th level of the Eureka and 79 D on the 7th level of the Eureka?

A. Perpendicularly?

Q. Yes, sir; perpendicularly and horizontally, both.

A. A hundred feet each, both perpendicularly and horizontally.

Q. Is the quartzite at 69 F almost exactly at right angles with the quartzite on the 8th level of the Eureka Consolidated?

595 A. Well, at the point 69 F it turns a right angle. The quartzite at that point turned a right angle. Thence, following the 6th level, as my pencil indicates, it turns in that direction at that point.

Q. Does it continue at right angles with the general course below, on the 5th level of the Eureka Consolidated?

A. It continue at right angles for about 65 feet, as far as the drift was run.

Q. Are there any workings to the southwest of the 5th level of the Eureka Consolidated—the northwest end of the 5th level of the Eureka Consolidated—that would indicate that the quartzite continues on in a southwest direction for a considerable distance from where it is found in the northwest end of the Eureka 5th?

A. No workings to indicate that the quartzite has any direction to the southwest of that point.

Q. What is the relative level of the 5th level of the Eureka Consolidated and the Lizette level of the Richmond?

A. 180 feet.

Q. The southeast end of the Lizette level is 180 feet higher than the northwest end of the Eureka 5th level?

A. Yes, sir.

Q. Is there any quartzite found in the southeast end of the Lizette level?

A. Yes, sir.

Q. Would that not seem to indicate that the quartzite in the northwest end of the Eureka 5th continued to run to the southwest for some distance to the southwest of the northwest end of the Eureka 5th level?

A. It would indicate that condition of things, or that it got very flat so as not to come in contact with the workings at the end of the Lizette.

596 Q. Have you got anywhere a memorandum of the exact course of the quartzite on each of the levels of these mines in which it is exposed?

A. My notes show the quartzite wherever it is exposed.

Q. Please repeat that answer?

A. My notes of survey show the exact course of the quartzite in all the levels.

Q. Can you arrange your notes so as to give in a few minutes the exact course of the quartzite whenever it is exposed to all of the workings lying to the northwest of the southeast end of the Champion line extending to the northeast?

A. I can find the notes of the different levels in a very short time.

Mr. Wren.—Well, I was going to ask the court, in order to save time, not to make this examination in regard to the course of the quartzite tedious, to recall the witness after he had arranged his notes so that he could put in the evidence in a few minutes, and to-morrow, perhaps, or some other time—omit it for the present. He has had very little time to arrange his notes, and it consumes time, on that account, that might otherwise be saved.

The Witness.—I can do it by to-morrow, and give all the facts.

Mr. Wren.—You can also give the exact course of all fissure-planes that occur in the Richmond, can you?

Witness.—Yes, sir.

Cross-examination:

Mr. Thornton.—Q. Mr. Westcoat, you stated that in 1863 you were engaged as a mining engineer on the Comstock?

597 A. Yes, sir.

Q. How long were you there engaged in that occupation?

A. Nearly 3 years; and then returned in 1867.

Q. What 3 years were you there at first?

A. I went there in May or June, 1863, and remained there until late 1865, and returned in 1867.

Q. After you were there, did you testify in any mining cases?

A. While I was there?

Q. Yes,

A. I did.

Q. Did you testify at that time to any veins as being separate and distinct veins which are generally since considered to be a part of the Comstock lode?

[Question objected to and not pressed.]

Q. Well, Mr. Westcoat, did you testify in 1873, in the district court in Eureka, in the State of Nevada, in a former trial between the same plaintiff and defendant that we have in this action?

A. 1873, about 3 years and a half ago; yes, sir.

Q. Did you make a map at that time, showing the workings and explorations of the Richmond?

A. I did.

Q. I wish you would look at this and see if it is a copy of the map [showing map].

A. That is not a copy that I made. It is not a copy of the map I made, showing any explorations in the Richmond mine.

Q. Did you make that map?

A. I don't recollect whether I made that map or not. You

asked me that question once before. I don't recollect whether I made the map or not.

Q. Well, haven't you examined the point since to see whether you made it or not?

598 A. What points?

Q. The map. Haven't you examined the map, the original or copy I served upon you, to see whether you made it or not?

A. You served a copy on me or loaned me a copy and then took it away from me again, and I never had time to examine it.

Q. Well, there was one served in the case,

A. I never saw it.

Q. Never did?

A. I won't be positive whether I made that—I am very certain I did not make that tracing; whether I made the original from which that is copied, I could not say; I don't recollect.

Q. Have you any memorandum by which you could determine whether you made that?

A. I have examined my memorandum and I can't find any notes that indicate that I made the map.

Q. You can't?

A. No, sir.

Q. Does that correctly represent the workings of the Richmond mine as they were at that time, as far as it goes?

A. Well, that I don't recollect.

Q. Have you got the note book from which you made the maps that you made for that trial for the Richmond company?

A. I have one of them; I have not both of them; I had two.

Q. Have you that one here?

A. I have.

Q. Well, does it not inform you whether or not those were the workings as they appeared of the Richmond?

599 Well, that I could not tell till I platted them out, you know. The notes don't give you the exact relation of all the points until you make a plat of them.

Q. Mr. Westcoat, can you state whether this map or a copy of this map was put in evidence——

A. I don't recollect of ever seeing the map.

Q. [Continuing.] In the equity case that is now pending in this court for injunction, between the same parties?

A. I don't recollect ever seeing the map before you showed it to me; but I don't say that I never did see it, and I don't say I did not make the original from which that is copied. I have no recollection of it.

Q. Can't you remember a map you made and produced on a trial, and testified from?

A. That is not the general map. If that was the general map I could do so, but that appears to be a matter that was hurriedly made, hurriedly got up, and I don't recollect it.

Q. Did you testify on that trial as to the course of the limestone foot wall of the Richmond, as far down as it was exposed in the workings of the Richmond?

A. That I don't recollect.

Q. Have you got a book showing?

A. Showing what?

Q. Showing what the course of the foot wall, as exposed in the upper workings of the Richmond, was.

A. I have one of my note books. There was one of my note books I could not find. I had two, and one I can't find. I sent over to Pioche for them, and one came and the other did not.

Q. Will you tell me whether or not, from that note book, you can tell what the course of the foot wall was, as you then testified?

600 A. I could not do it without compiling it; without looking over it for some time. I will examine it and tell you to-morrow. When I am called again to-morrow I will tell you what I know about it.

Q. Is there any way for you to ascertain whether this correctly represents the workings of the Richmond, as they were then exposed?

A. If I have it in my note book I can ascertain, and if I have not, I cannot.

Q. A great many of those workings of the Richmond are caved and filled in, are they not?

A. Yes, sir.

Q. Have you upon your present map, Exhibit No. 1, the workings represented exactly as they are represented on this map, or have you left out a portion of it—of the workings?

A. Well, there is a number of those workings—they were shown on my original map—that I could not get to on this occasion, and consequently they were not on.

Q. Well, have you a memorandum book, so you can mark them out in pencil on the map named Exhibit?

A. I have not.

Q. You cannot put them on there for us?

A. I can. I can do it when I get the original map. I have got the original map, but it is not in the office.

Q. It is not?

A. No, sir; it is not in the court-room.

Q. Now, those workings showed a greater extent of ore from the Tip-Top incline over toward to the Champion croppings?

A. There is one body of ore—my impression is there is one body of ore that is not shown on that map.

Q. And it is between the Tip-Top incline and the Champion croppings?

601 A. Yes, sir.

Q. Well, I wish you would try and get your notes, so as to try and put that on the map.

A. Well, I have got the map.

Q. Because that is very important.

A. I have got the map.

Q. O, you have the original map; well, I wish you would come prepared to do that at some future time.

A. I will do so, sir.

Q. Mr. Westcoat, in that case was not the controversy between the parties that the Eureka Consolidated contended that the body of ore, under and in the Lookout, was a saucer-shape deposit, as separate and distinct from a vein; and that the Richmond contended that it was a vein, running from the Tip-Top to the Champion and Buckeye, and on toward the east?

A. I don't recollect of any saucer question coming into the transaction.

Q. Well, don't be quite so critical. I asked you a general question, and would like to have you answer it candidly, and not in that style.

A. Well, I will tell you. You may think my memory is much better than it is, but it having been three years ago, and I not charging my mind in regard to it, it is impossible for me to recollect anything but the generalities as to what I did state, without looking over my testimony,

Q. That is one of the generalities. We contend that body of ore in the Lookout was a separate deposit in the limestone.

A. I don't regard it so.

Q. Did you not testify it was not so, but was a part of the vein which had cropped out in the Tip-Top and in the Champion and Buckeye?

602 A. I think I did not contend anything of the kind.

Q. You think you did not so testify?

A. Yes, sir, I would think so, until I saw my testimony.

Q. Well, what was the issue between the parties? What did you testify to then? A general statement of it.

A. If I ever did know what the issue was, you lawyers are very careful about stating to outsiders what the issue is; and I don't recollect now what the issue was.

Q. Well, what did you testify to on that trial generally, not specifically?

A. I don't recollect what my general testimony was.

Q. Well, were you there to support the ledge theory or not?

A. I don't recollect that either.

Q. Can't you recollect generally? You stated just now that you could state generally what you testified to on that case.

A. Well, my recollection of generalities is that I testified that there was a body of ore cropping at the Tip-Top incline, and followed down to the deepest workings. That is all the generalities I recollect of; as to details, I don't recollect.

Q. Did the Eureka company deny that?

A. I don't recollect whether they did or not. My testimony is in existence, though, if you want to pin me down to what I said.

Q. Oh, I don't want to pin you down, Mr. Westcoat. I just want a general statement of what the issues were.

A. Well, I don't recollect.

Q. What?

603 A. Now, in stating what I don't recollect, I am just as honest as you are in stating what you do in trying to get it out of me that I do not recollect.

Q. The workings of the ore are just as they are represented on that map, are they not? The Richmond workings exposed a body of ore that is represented there within the lines of the Lookout patent?

A. Under, yes; immediately under.

Q. Well, don't you know that the Eureka Consolidated was claiming that body of ore?

A. They were; I recollect that.

Q. Well, did they claim it as a separate deposit and as distinct from this vein or body of ore, which the Richmond had followed down in the Tip-Top incline, or not?

A. I think they claimed it as an outcrop from their surface; that is my recollection.

Q. As a separate body of ore?

A. They claimed it as being under their location and part of their property.

Q. Do you remember that we called as a witness Mr. Stettefeldt, who swore as to the theory of deposits in limestone of ore?

A. I didn't hear Mr. Stettefeldt's testimony.

Mr. Wren.—The witnesses were put under the rule.

Mr. Thornton.—Yes, but I thought he could state candidly what the issue was, and what he testified to himself.

Witness.—I didn't change my mind. It has been three years and a half ago, and it has passed out of my mind entirely, all particulars.

Q. You say that your testimony is in existence as given on that trial, Mr. Westcoat?

A. I suppose so.

604 Mr. Wren.—I have the testimony written out by the shorthand reporters, and if you desire to put the whole of it in I will furnish it to you.

Mr. Thornton.—Well, I will read it and see.

Q. Mr. Westcoat, you have testified as to some iron stains in what you call the Iron shaft, and have so represented on your map, Exhibit 1. Did you say that there was ore or not ore exposed in the Iron shaft?

A. I say that I saw no ore.

Q. How wide or thick was the seam that you saw there?

A. Well, I didn't see any seam that I considered a seam nish color, or of vein matter. There is a wall there dipping to the west.

Q. A wall?

A. A kind of face dipping to the west or southwest, but I plane, no ore on it. was

Q. It was a smooth plane of the limestone, was it? 40

A. It was not smooth, it was rough.

Q. But it was of limestone?

A. Yes, sir. ss

Q. The Iron shaft is entirely in limestone?

A. Yes, sir.

Q. Now, this vein runs across that shaft in which direction, which course?

A. This wall that I refer to runs in about the direction of the Tip-Top incline from the shaft.

Q. About the same course?

A. In that direction.

Q. Well, runs towards the Tip-Top incline?

A. Yes, sir.

Q. Well, you say you did not go down that shaft?

A. I did not, sir.

Q. How deep is it?

A. About 20 feet.

605 Q. Well, how thick at any point was the seam that you saw of ore matter or iron stains lying upon that face of limestone?

A. Well, the iron stains appeared to be distributed around the shaft indiscriminately. I saw nothing that I thought was a vein.

Q. Kind of network of iron stains?

A. Well, it was indiscriminately around the shaft. It appeared to be sunk in a body of iron-stained limestone.

Q. Well, did you not see any low-grade ore there?

A. I did not, sir.

Q. None at all; nothing in the shaft?

A. I saw something that looked like low-grade ore on the surface.

Q. How far from the edge of the shaft?

A. Nothing in place. I did not see anything in place that looked like ore. What I saw was outlying on the dump.

Q. As if it had been taken out from the shaft?

A. Brought from somewheres. I don't know where it was brought from.

A. But it appeared as if it had been taken from the shaft; whether put there by some one else or not you do not know?

A. I saw it on the dump; to all appearance it came out of the shaft.

Q. When did you examine that shaft for those indications of ore?

A. Well, I have examined that shaft probably a dozen times altogether.

A. I And still you never went to the bottom to see whether there re there or not?

in exis A. Well, I did not like to go down to the bottom without a Q rope or ladder; it was difficult to get out.

a g06 Q. Did you see any galena in that shaft or at the top edge of that shaft?

A. I did not.

Q. None in place, or otherwise?

A. No, sir.

Q. You spoke of two holes upon the At Last?

A. Yes, sir.

Q. Exposing ore stains.

A. Dark limestone.

Q. What distance apart were those two holes?

A. Thirty or forty feet; I can tell you exactly.

Q. Well, you need not tell me exactly.

A. Thirty or forty feet.

Q. Did they expose smooth planes of limestone?

A. One of them did; the other did not.

Q. Of what length and depth did it expose that plane of limestone?

A. Four or five feet horizontally, and three or four feet perpendicularly.

Q. What was the course of that plane?

A. That plane extended—the course of it was about in the direction of the Lookout shaft.

Q. Well, can you tell generally, with reference to east and west or north and south, what the course of it was?

A. I have got a note of it somewhere, but that is the direction. I can tell by looking on the map. It is about the course.

Q. Well?

A. Northwest or nearly west.

Q. Did you see a seam of ore there?

A. I did not, sir.

Q. Ore matter?

A. No, sir.

Q. What was there lying upon the face of that?

607 A. Nothing at all; smooth wall.

Q. Any ore stains there?

Q. There were stains of some kind. They didn't look to me like iron stains. They looked to be a paler stain than iron stains.

Q. But something like an iron stain?

A. Dark limestone.

Q. What stains are paler than iron stains?

A. Well, I don't know that this was a stain at all; it might have been of the character of the limestone.

Q. Well, it was different from the color of the limestone, was it not? Was it not pale red or a little yellowish?

A. No red at all. It was more of a light brown—brownish color, very light.

Q. What was the size of the vein or seam of that?

A. I saw no seam at all. It just appeared to be a fissure-plane, and the upper part of it was taken away, and the lower part was left like your hand [clapping the hands together], dipping about 40 or 45 degrees to the north.

Q. Now, where the opening went down, along this face of limestone, at each end of the opening, couldn't you tell the thickness of that seam?

A. Well, my recollection is, and I took no notes to the contrary, that it was just a smooth fissure, a smooth cut in the limestone, with the upper part taken away, the upper face taken off.

Q. Now, then, you testified to an exposure of ore at a point along the roadside, about 200 feet towards the Champion Nugget from the Tip-top incline?

A. Yes.

Q. About 200 feet distant, wasn't it?

A. About that; yes.

608 Q. What did you say was the size of that?

A. Three or four feet in diameter.

Q. What depth?

A. Well, it was no depth at all; no more depth to it than this floor would have; simply an exposure of that material on a smooth surface on the upper part of the road.

Q. Had it been dug out in working the road, or for the purpose of prospecting?

A. Merely exposed in digging the road—in excavating for the road. No depth to it. It might have been a few inches lower than the general surface.

Q. Now, Mr. Westcoat, were not these openings at the Iron shaft and on the At Last such as were made or would be made by miners in prospecting, seeing these faces of limestone and ore indications, where they would go down to look for the ore-body?

A. Well, in the Iron shaft it might be, but in the others I think not. A man was digging down three or four feet in those, found he was mistaken, and quit.

Q. You think he had the impression until he dug it out, or nearly?

A. I think he found he had overmatched himself, in thinking he had a lode, and quit.

Q. You spoke of the Ruby Hill tunnel. That commences to the south of the great body of shale which you have represented on that map [pointing], and runs into the limestone towards the Eureka Consolidated mine, does it not?

A. Yes, sir.

Q. And is how many feet in length?

A. About 350 feet, my impression is; 250 or 350.

Q. And passes, does it not, through solid limestone?

A. Yes, sir.

609 Q. And does not cut any vein or seam or indication of ore anywhere?

A. No, sir; none that I could find.

Q. And you have examined it critically.

A. I have examined it three or four times.

Q. You were speaking as to the characteristics—the appearances of the limestone within and out of the vein; that is, between the quartzite and the shale, and that outside of the shale, further to the north, and you said that, with the eye, you could detect no difference.

A. I could not.

Q. Are you skilled in rocks, and in telling the difference between the rocks? Are you a geologist?

A. Well, nothing except by general experience.

Q. You have no very great familiarity with these rocks?

A. Well, nothing, only seeing them and handling them, and burning lime with them, when I was a boy, and so forth.

Q. Well, do you pretend to be skilled in the rocks, or not?

A. Well, every man is skilled so far—according to his practice.

Q. Do you know the component parts of limestone?

A. Well, different limestones have different component parts.

Q. Can you state the parts of limestone?

A. Well, I can give you a portion of the constituents, and if you wish them, I will give you the whole thing, from the azoic up to the tertiary, including the trachytes.

Q. Well, would you get them from the books, that description you would give me?

A. Yes, sir.

610 Q. Did you ever analyze a piece of limestone?

A. I never did, sir.

Q. Did you ever use a microscope upon a piece of limestone?

A. I have.

Q. You have?

A. Yes, sir.

Q. Where?

A. Different places.

Q. Any upon this limestone?

A. Yes, sir.

Q. Where was it?

A. Ruby Hill.

Q. Did you see any difference between them with the microscope?

A. I could detect differences in pieces of limestone taken from points two or three feet distant from each other, and you could find a number of varieties of limestone there, but no general difference between that inside, the interior as you call it, and the exterior limestone.

Q. Mr. Westcoat, you have spoken of a number of fissures in the Richmond, and Mr. Wren has asked you to bring with you to-morrow a memorandum of those, their number and courses, and length and depth. How many are there?

A. Well, there is a fissure exposed on the 82d level. There is one exposed from the 2d to the 3d level, from the 3d to the 4th; on the 3d level, and in different places through the mine.

Q. Well, are those the same fissures?

A. I can't tell you. We know that they are the same from the second to the third, and from the third to the fourth, because we followed them right down.

611 Q. From the second to the third, and the third to the fourth?

A. Yes, sir.

Q. That is the only one you can tell is the same or not?

A. Only one you can tell, only from this general appearance and their relation, so far as dip and strike is concerned. You cannot tell whether one fissure is the same as another unless you can follow it right along, to make sure of it.

Q. Are there not fissures along from the second to the third and the third to the fourth?—other fissures than those you have mentioned, with a different course?

A. I think not, sir.

Q. Are there any other fissures observable except those you have described as the main fissures?

A. In that vicinity? In the vicinity there?

Q. Yes, sir.

A. I think not, sir. I don't recollect any.

Q. Are there any fissures exposed there which run at right angles to those fissures that you have described, or nearly at right angles?

A. Well, there may be cracks or breaks in the limestone. I don't think there are anything we call fissures.

Q. They are small fissures, are they not?

A. You might call a break in the limestone a foot long a fissure, but I would not call it a fissure.

Q. Well, did you see a great many of that sort?

A. Oh, the limestone is broken and cracked in places.

Q. And full of fissures, is it?

A. Well, in places, it is. In places it is more or less broken; in other places it is solid.

612 Q. And full of fissures?

Mr. Wren. Don't put words in his mouth in that way, Mr. Thornton.

Mr. Thornton.—Q. Well, what do you say about its being so?

A. I say there is nothing in the limestone that I call fissures, in the vicinity of those fissures I have named.

Q. Well, are they breaks, or cracks, or seams?

A. There are some. Yes, sir.

Q. How do you mean to say? Are there a great many, or not?

A. Well, some limestone is broken up. You can find fissures or breaks or seams in the rock every few feet; other places again you go some distance and you don't find any.

Mr. Wren.—Q. How is that Mr. Wescoat?—that last answer.

A. I say there are some places in the limestones where you will find breaks or cracks in the limestone every few feet? Then you will find other places where there are a number of feet that you don't find any of those fissures or breaks.

Mr. Thornton.—Q. Now, Mr. Westcott, you say you call these larger fissures, fissures which you describe and which you were going to bring the course and dimensions of. But the other fissures you don't call fissures, because they were not extensive enough. Did I understand you to say that?

A. They are simply a break or a crack in limestone. You lay a piece of rock down and break it in two; it makes 2 faces, but I would not call them fissure-planes.

Q. Well, your idea is that the fissure-plane depends upon the extent of it—the size of it?

613 A. No; not its extent, but its general appearance, its general rule as to dip and strike, and its smooth surface. Where I find a piece of limestone as large as this model [referring to defendant's model] broken and cracked in every direction, I would not call them fissure-planes.

Q. Now, Mr. Westcoat, where you have found those fissure-planes in the Richmond, have you not seen on the other side of the drift, frequently, indications of a fissure-plane, no matter how small, coming at right angles, or in a different direction through the unbroken rock at the opposite side?

A. Nothing that I call a fissure-plane. No, sir.

Q. Well, suppose one of those had been pursued two or three hundred feet where it is now unopen, wouldn't you call it a fissure-plane?

A. Well, if it had a general strike and a general dip, and signs of motion upon it, and were smooth, I would call it a fissure-plane.

Q. Well, it has not been pursued, and you cannot tell whether it opened out that way or not, can you?

A. Well, a man of much experience could tell whether that was a fissure-plane or not, by general appearance.

Q. What is the general appearance you could tell by?

A. I don't recognize any of those fissure-planes you are speaking of; therefore I can't tell about them.

Q. I ask you——

A. None that I recollect of.

Q. Do you recollect any cracks or fissures in the Richmond works, other than those you have mentioned?

A. Nothing that appears to me to be extensive
call fissure-planes.

Q. Well, do you remember some, then?

614 A. Nothing, only except the general cracks
in the rock.

Q. Well, those general cracks or laminations in the r
we will say, on the north side of the drift or winze whi the line is
on this fissure-plane, which we will call the Richmond
have you ever seen any of those pursued in their
north or northeast?

A. Well, in the first place, I don't recollect then

Q. Well, if you don't remember any—but I ask yo
any? Do you say there are none?

A. I don't recollect of any. I don't say there ar don't
recollect it.

Q. I thought you were saying just now the rock a good deal
cracked and broken up?

A. In places, I say, it is cracked.

Q. Well, is it anywhere cracked or broken limestone near to this fissure-plane, or the fissure-planes you were speaking of?

A. That I don't recollect.

Q. Well, do I understand you to say now that you can't state whether in the Richmond workings the limestone is found broken broken up or cracked at all, or not?

A. I said it was, in places.

Q. Well, in what places? Describe the place to me.

A. Well, I don't recollect any place now, without referring to my notes. I don't recollect any particular point now, without referring to my notes. If I were to look indiscriminately over my notes, I might look a long time before I should find it. If you have any particular point you want to call my attention to, I will look for that particular description of the locality.

Q. Now, Mr. Westcoat, can't you tell, without looking at
615 your notes, from the general appearance and conditions of
the limestone down in the Richmond works, as to whether or not it is cracked and broken in every direction, or whether it is compact and stratified and whole?

A. Well, now, Col. Thornton, I have told you a half a dozen times, as explicitly as possible for me to do, that there were places where the limestone is cracked and broken up and laminated; other places it is quite solid. Now, that is all I can tell you, unless you draw my attention to a particular point; then I will give it.

Q. Is any of that limestone in the Richmond works stratified, exposed in the Richmond workings?

A. Yes, sir.

Q. At what point?

A. On the 8th level for 100 feet, and on the 7th level for 100 feet, near the end 90 or 100 feet.

Q. Well, are the limestone anywhere else stratified, as shown in
A. These workings?
Q. Don't recollect of any other stratified limestone.
A. Well, that stratified limestone has not been broken up and ore led into a mass with the stratification entirely destroyed?
A. No; if it was destroyed we could not see it.
Q. Now, is not all the rest of the limestone that is exposed in the workings of the Richmond crushed and broken up, and the stratification destroyed?
A. No, sir.
Q. Where isn't it?
A. Well, I know places in the mine. There is very little limestone in the mine that could be considered crushed up or designated under the head of bruckshe (?). Very little of it.
Q. I am not talking about technical words; has it been broken up so as to destroy the stratification?
616 A. Well, there is no stratification there. I don't think the breaking up and powdering has destroyed it.
Q. Well, do you suppose the limestone there was originally stratified?
A. Probably so, sir.
Q. Probably?
A. Yes, sir.
Q. Well, what is your opinion about it?
A. Well, I am satisfied that all limestone was once stratified?
Q. Well, what has become of the stratification and original forms of that limestone?
A. Well, it is said to be changed. The stratification of lime is destroyed by heat. I don't know whether it is the case there or not.
Q. It has been destroyed there by something, hasn't it?
A. Yes, sir.
Q. Has it been destroyed by any breaking or cracking, or any force?
A. No, sir; no, sir! Emphatically, no.
Q. And there are no fissures that you can find down the Richmond works, excepting those main fissures, which you call the foot wall of the Richmond pipe-vein?
A. There may be some fissures discovered that I don't know anything about.
Q. Mr. Westcoat, you say that on your map marked Exhibit 1, the line of shale, as it is found in the workings, is marked by a certain line of what color?
A. By a blue line.
Q. Now, in what workings of the Richmond do you find that shale commences at the highest working where it is found?
A. On the 6th level, I think.
617 Q. And marked upon your map, where it is found, if any?

A. Yes, sir.
Q. Then, is it found upon the 7th level?
A. Yes, sir.
Q. Just as marked upon your map?
A. Just as marked on the map.
Q. And upon the 8th level?
A. Yes, sir.
Q. You will have to come here and see this, because the line is small.
[Witness goes to the map.]
Q. [Continuing.] Upon the 7th level at the point 72, 7th level of the Richmond at the point 72, you find that shale, do you not?
A. Yes, sir.
Q. And it is marked there, as represented?
A. Yes, sir.
Q. Then, do you find it also on the 7th level at the point marked 71?
A. Yes, sir.
Q. Now, do you find it also on the 7th level at the point marked 74?
A. Yes, sir.
Q. Now, do you find also a line of fissure at the point marked 73?
A. I do not, sir.
Q. Do you find any shale in that drift beginning at 73 and running towards the north?
A. Not a particle of shale.
Q. Not a particle of shale?
A. No, sir; not a particle.
Q. You have examined it?
A. Carefully.
Q. Is there any clay there?
618 A. No, sir.
Q. No seam of clay next to the wall?
A. No, sir; no, sir; not a bit, and no body else.
Q. You have never seen it?
A. It ain't there, that is the reason I did not see it?
Q. But the shale turns off abruptly, and runs in that direction?
A. Turns off abruptly; on the 7th level the shale is followed by developments from 71 on the 7th level, in a northeast direction for 14 feet, and 74 it is followed for 20 feet.

Mr. Wren.—Q. In what direction?
A. In the southeast.

Mr. Thornton.—Q. Now, Mr. Westcoat, what do you find in that drift I pointed out, commencing at 73 and running——
A. Running off to the northwest?
Q. To the northwest.

A. I found a fissure-plane containing ore.

Q. Now, on the face of that fissure-plane, is there not a line or seam of clay?

A. Not a particle,

Q. Now, for what distance do you follow that fissure-plane?

A. For over one hundred feet.

Q. In that drift?

A. Yes, sir.

Q. And that fissure-plane faces interiorly or into the vein, does it not?

A. It has a dip of 66, northeast.

Q. And as you go from the beginning of the drift to the end, it is on your right-hand side?

A. Yes, sir.

Q. As you pass along?

A. It dips to the right.

619 Q. And if you follow that shale from there to there [showing on map], from the point 72 to the point 71——

A. You don't follow it at all; it goes off in that direction, point 71.

Q. You leave it at point 72?

A. I leave the shale at point 72, on the 7th level of the Richmond, and find it at point 71, at which place it turns, as shown by developments, abruptly to the right.

Q. Now, then, if it extends almost in an abrupt line from 72 to 71, which is not exposed, if it does and pursues its normal course, wouldn't you expect to find it along in that direction?

A. We would, but we find by development it don't go that way. We find it turns to the right. That is the right here [pointing].

Q. Now, if there is a seam of clay along that fissure-plane, which you have described as running over a hundred feet in that drift—if there is a seam of clay along that, could it not connect with that body of clay or shale?

A. It could, but it don't do it.

Q. Now, at what other points, Mr. Westcoat, did you find that clay shale in the workings of the Richmond? On the 8th level?

A. I found it on the 8th level; on the 7th level.

Q. Name the figures.

A. I found it on the 8th level at point 83, dip 85 to the northeast. I found it on the 7th level at point 74, and about the same dip. I found it at 71 on the 7th level, nearly a perpendicular dip. I found it at point 72, with a dip of 70 to the northeast. I found it

620 on the 6th level at point 61, with a dip of 90. I found it on the 6th level in a cross-cut at point 62, with a dip of 80 northeast. I found it on the 6th level at point 63, with a dip of 85 to the northeast. There it disappeared, and I did not see anything more of it.

Q. Now, Mr. Westcoat, isn't the stratified limestone of which

you have spoken to the northeast of that drift, from 73, running northwesterly?

A. It is, between the drift you were speaking of and the end of the 7th level.

Q. So it is within the shale that you described; but if there were a line of shale running across where I have described, from 72 to 73, and along that drift, it would be outside of that shale, wouldn't it?

A. It would; but there is not any shale there.

Q. That is a question of fact we differ upon. Did you find the shale near the mouth of the Bell-shaft tunnel?

A. I found a seam of what I call clay near the mouth—about 30 feet from the mouth.

Q. Well, also near the mouth of the Utah tunnel?

A. Near the Utah shaft, in the incline.

Q. Now, did you find a body of shale in the drift—the 10th level drift of the Eureka Consolidated, at its northern point?

A. Yes, sir.

Q. Well, for what length was that shale exposed?

A. About 200 feet.

Q. In length?

A. Yes, sir.

Q. You speak of clay and shale; is there any difference between them, or do you make any difference between them?

A. Well, I call that material below there—I call it, I think there is more clay than shale.

Q. Well, what are the component parts of clay?

621 A. Well, Jukes said that 75 per cent. of clay would be limestone; I don't know whether he is right or not.

Q. What are the component parts of, or what composes, shale?

A. I don't recollect now the component parts of shale.

Q. What constitutes shale?

A. Well, there are different component parts of shale, and there are different shales; there is argillaceous shale and calcareous shale; the calcareous shale has less argillaceous matter in it than the other.

Q. What makes shale?

A. Well, shale is derived from the word shell; it is a shelly rock—that is what Webster says.

Q. Well, can you tell, or have you answered sufficiently for your own satisfaction, what constitutes shale?

A. I don't recollect the component parts of shale, more than I have stated.

Q. Nor of clay?

A. I say that clay—Juke says—75 per cent. of clay can be calcareous matter.

Q. I know, but do you know the difference between clay and shale?

A. I do.

Q. What is the difference?

A. By its general appearance; I would not examine its component parts; I know clay; I know rocks the same as I know wood; I can tell a piece of black walnut from a piece of white pine, not from its constituent parts, from its elementary parts, but from its general appearance.

622 Q. Well, do you think that clay, or shale as we will call it, that you found in the Bell-shaft tunnel is the same material that is found on the 6th or 7th levels of the Richmond?

A. I do not, sir.

Q. You don't consider it the same material?

A. No, sir

Q. You think it is a different matter?

A. I do.

Q. How does it differ from the shale in the 7th level of the Richmond?

A. Well, in the first place, the shale in the 7th level of the Richmond is about 100 feet thick; that in the Bell-shaft tunnel is about 18 inches thick, and I have been unable to trace that clay to the north or to the south. I think it is local altogether.

Q. Are there any openings in the surface from the Bell-shaft tunnel which disclose the croppings or top of that shale or clay?

A. Nothing; there are several cuts made there, but nothing which I think that shale appears.

Q. For the purpose of finding it?

A. Yes, sir.

Q. Could you find it in those cuts along there?

A. Well, I was not seeking to—was not minding about it myself, but I failed to see it in those cuts.

Q. Did you go over the ground afterwards and examine the cuts?

A. I did; I have got them all marked on my maps, and can explain each one to you.

Q. And you did not find it there?

A. I did not.

Q. Now, then do you recollect the northernmost point of the $8\frac{1}{2}$ level of the Eureka?

A. $8\frac{1}{2}$; I don't recollect any $8\frac{1}{2}$ level. You mean the $7\frac{1}{2}$, don't you, or the 6th?

623 Q. No, the $8\frac{1}{2}$. Have you been in there since that has been opened, extending to the shale?

A. Not on the $8\frac{1}{2}$. I don't know any $8\frac{1}{2}$.

Q. Did you see any clay or shale on the 2d and 3d levels of the K. K?

A. I did.

Q. And you have marked its course and extent with the blue line upon the map?

A. Yes, sir.

Q. Were you ever down the Jackson mine?

A. No, sir.

Q. What do you think about that clay or shale that is found in the K. K.? Do you think that that is a part of the same general line of clay or shale extending over to the Richmond?

A. Well, I followed out the clay to its terminus in one direction, and think it can be followed to its termination in the other direction, if you had the developments to do it?

Q. Where did you follow it to its terminus?

A. At a point about 50 feet easterly of a point marked "filled" and "65." About 50 feet easterly of the point marked "65" and the same point marked "filled."

Q. You say it gives out there entirely?

A. Stops.

Q. The end of where it should be is enclosed in limestone?

A. The limestone and quartzite comes right together?

Q. Ah! The limestone and the quartzite come together? Isn't there a seam between them?

A. No, sir; it runs out entirely.

Q. On what level is that?

A. On the 6th level of the K. K.

624 Q. On the 6th level of the K. K. the quartzite and the limestone come together?

A. In the first place, the clay which runs on one side of the limestone and the quartzite on the other, the clay shuts the limestone out entirely, and then the overhanging limestone, after running a short distance, shuts the clay out, and the overhanging limestone and the clay, the quartzite, comes right together.

Q. The overhanging limestone and the quartzite come right together?

A. Yes, sir; shutting out both of the formations?

Q. Shutting out the clay?

A. Shutting out the clay.

Q. And the interior limestone?

A. And the interior limestone. The limestone, which the clay bounds easterly, both come together and shut up.

Q. Now, at the point where the quartzite and the overhanging limestone come together, is there not, so far as you can look into the face of the drift, a continuous seam between the two?

A. There is a separation between the two.

Q. Well, what fills the point of separation—the line of separation?

A. In one the quartzite comes to the limestone like my two hands [showing], not a thing between them.

Q. Not a thing between them?

A. No, not a thing.

Q. No discoloration?

A. No, sir.

Q. What is the color of them?

A. The quartzite has the general appearance—it has a reddish appearance, and the limestone has a gray appearance.

625 Q. Mr. Westcoat, on the 5th level of the Richmond, running northwest, do you find a body of ore?

A. I do, sir.

Q. On the 5th level of the Richmond, running to the northwest?

A. [Pointing to it.] Yes, sir.

Q. Is that body of ore marked upon your model?

A. It is not, sir.

Q. What are the dimensions of that body of ore? Let us know the size.

A. As indicated upon the map here, it is probably 20 or 25 feet in extent.

Q. That is along the level?

A. Along the level and laterally.

Q. How high up has it been followed?

A. 25 or 30 feet.

Q. How far down below the level has it been followed?

A. I think not at all below the level.

Q. Are the 4th and 6th levels being run out to cut that body of ore?

A. No, sir; the 6th level, all the developments in that part of the mine have been stopped lately.

Q. So the 6th level don't reach that body of ore?

A. No, sir.

Q. Or where the body of ore would be below?

A. No, sir.

Q. Is that body of ore a portion of the Richmond pipe-vein that you have been speaking of?

A. There is no connection. There are no developments showing any connection.

Q. No fissure-plane or anything to connect?

A. I don't know. The developments don't show it.

Q. None, as you had been shown?

A. No, sir.

626 Q. Mr. Westcoat, did you testify as to whether or not the 5th level ore-body of the Eureka Consolidated is, in your opinion, a part of the Richmond pipe-vein?

A. I did not.

Q. Well, what do you think about it?

A. I don't think the developments have gone far enough for me to form the theory upon it; not enough to base a theory upon.

Reporter.—Louder!

A. Not found enough, in my opinion, to base a theory upon. It is a new development.

Q. Does that body of ore rest upon the quartzite?

A. In places; yes, sir; it does.

Q. Above the level, how far did you follow that body of ore?

A. 60 or 65 feet.

Q. Resting upon the quartzite?

A. No, sir; next to the quartzite.

Q. How many feet does it go up before it leaves the quartzite and branches up into the limestone about 15 or 20 feet? How, in following that ore-body down towards the 6th and 7th levels—how far did you follow that ore-body, in your opinion?

A. I have no opinion about it. I have not got the facts.

Q. Well, give what you suppose to be the facts.

A. 50 feet.

Q. And then you lost sight of it?

A. The drift stops. The drift don't go any further.

Q. And ore is in the bottom of the drift, is it?

A. Yes, sir.

Q. And looked as if it continued further down?

A. Well, it was getting smaller.

Q. It was getting smaller?

A. Yes, sir.

627 Q. Well, how small did it get before they stopped the drift?

A. Well, on the right-hand side of the drift, it ran out entirely. On the left-hand side there was a few inches, or, maybe, five or eight.

Q. A few inches of rich ore?

A. Pretty good ore.

Q. Is that upon the quartzite where the drift stops?

A. Yes; that is upon the quartzite.

Q. Now, do you find any ore between that and the 9th level ore-body, in going down these various works which are made there, connecting it?

A. You find ore connecting the 5th with the 6th.

Q. All the way from the 5th to the 6th level?

A. No; not all the way.

Q. Well, how many feet?

[No answer.]

[Here the court adjourns until to-morrow morning at ten o'clock.]

628 SEVENTH DAY.

TUESDAY, *July* 31, 1877.

N. WESTCOAT recalled. Cross-examination—Resumed.

Mr. Thornton.—Q. What is that map you hold in your hand?

A. Map used on the trial three years and a half ago, of the Richmond and Eureka.

Q. Who made it?

A. I did.

Q. This representation of an ore-chamber, from the ore-chamber which lies under the line between the Richmond and Lookout claims, running further towards the Champion than any chamber marked upon your map Exhibit 1; will you place that chamber upon your map with pencil? To what point would it come?

A. The southerly end of it would come to a point half-way between the west corner of the Lookout and the southwest corner at a point where I hold my rule.

Q. At that point marked a figure 5?

A. [Marking on Exhibit 1.] I have marked it in pencil, figure 5.

Q. Mr. Westcoat, in yonr opinion, can the croppings at the mouth of the Tip-Top incline line, a Champion ore-chamber that is marked on your map, and the Buckeye ore-chamber, be connected in ore?

A. I think not, sir.

Q. Did you testify on a former trial that you thought they could be, with proper workings?

629 A. I think not, sir. I have no recollection of any such testimony.

Q. Have you read your testimony lately, that you gave on that trial?

A. About two months ago.

Q. Don't you remember reading that in it?

A. I do not, sir.

Q. On the map which was used on the former trial, and which you have just held in your hand, what letter represents the mouth of the Tip-Top incline?

A. The letter C.

Q. Did you not testify on the former trial that in your opinion the vein extended from the letter C along through the Champion ore-chamber, the Buckeye ore-chamber, and to the workings at the surface on the Phœnix?

A. I have no recollection of testifying to that effect.

Q. Well, do you swear whether you did or not?

A. I don't swear positively; no, sir. I say I don't recollect.

Q. You testified yesterday that all you could state with reference to your former testimony was, as to those workings down under the surface from the Lookout.

A. That is all I recollect of definitely.

Q. Have you refreshed your recollection further, as to what you had testified?

A. I have not.

Q. You can't testify anything further as to what you testified to on that trial?

A. I don't recollect now. I can't recollect without looking over my testimony.

Q. Weren't you asked, as an expert, your opinion as to whether that was a vein or not.

630 A. Well, that I don't recollect. It is very possible. I can't recollect all my testimony for three years.

Q. Not all, but the most prominent parts of it?

A. I don't recollect that part of it; no, sir.

Q. You don't recollect anything you testified to, except as to the workings from the top of the incline down in the Lookout?

A. I recollect nothing except the generalities; I don't recollect the particulars.

Q. Mr. Westcoat, what does that tracing represent? [Showing a tracing.]

A. It represents the workings on the Richmond, Eureka, and K. K.

Q. Is it a map made by you a short time ago and filed in the equity case in this court?

A. It is either a map that I made or a copy of it.

Q. On the map that is marked Exhibit 1, have you marked by figures the point 55 on the 5th level as it appears on that sketch?

A. Have I got it where?

Q. Marked on that Exhibit 1?

A. I have, at the point 55 on the 5th level of the Eureka.

Q. The same that is on that sketch? [Referring to the tracing shown.]

A. Yes, sir.

Q. Is 56 on the 5th level marked on Exhibit 1?

A. Yes, sir.

Q. Is 75 on the 7th level and 79 on the 7th level? Are those two points marked on Exhibit 1 the same as on that tracing?

A. Yes.

Q. Are 88 and 89 C marked on Exhibit 1, the same as on that sketch—on the 8th level?

631 A. Yes, sir; they are.

Q. And are 95 on the 9th level and 99 E, marked on Exhibit I at the same points as on that sketch?

A. They are.

Q. Are 98, 99 A, and 99 B marked on Exhibit I as they are on that sketch?

A. I cannot find any 99 A here?

Q. Well, 99 A and 99 B?

A. 99 and 99 D are.

Q. 99 A and 99 D; they represent the points where the 9th level passes into and passes out of the quartzite?

A. Yes.

Q. In that cape near the shaft? Mr. Westcoat, had the body of ore at the end of the 5th level been discovered or exposed when you made that map?

A. When I first made it, it had not.

Q. When you filed your affidavit in the equity case had it been discovered?

A. No, sir.

Q. You testified then as to the size of this barren belt of limestone, which you testified to on yesterday, did you?

A. I did.

Q. Is that barren belt of limestone made narrower by the discovery of that ore-body at the end of the 5th level?

A. It is my impression that that body of ore in the 5th is not within the belt of limestone, as I testified yesterday—the barren belt that I testified to.

Q. Didn't you testify that it was barren from those workings of the Richmond over to the ore-bodies at the east end of the Eureka Consolidated claims, near the Lawton shaft?

632 A. The workings of the Richmond at a certain point, but I think it was not in that locality; I think it was off here in this direction [showing], along the space between the croppings of the Tip-Top and the croppings of the Champion.

Q. It is in there that you place the barren zones of ore?

A. That is my impression.

Q. Well, didn't you extend it on down and say it continued between those bodies of ore?

A. I did, so far as the development went to show.

Q. Isn't that ore-body right in that solid bed of limestone which you testified about?

A. It may be. My impression is it is not. Could not tell without examining my testimony.

Q. Where did that zone go, if it did not go down there on the east side of the ore-chamber of the Richmond?

A. My impression is, that my testimony was, commencing at R at the top of the Lizette incline and extending to Z, where my ruler is, and extending in that direction; if so, it would admit that body of ore; that is my impression as to my testimony; that the barren zone I testified to was in this locality, R, extending to Z, and then on in that direction [showing]; if so, it admits that ore-body.

Q. Well, you knew nothing of that ore-body when you did testify?

A. I did not, sir. I testified in regard to what was in sight.

Q. At that time?

A. Yes, sir.

Q. Now, then, if you testify as to the width of that barren zone of limestone, from the winzes which lead down to the Liz-

633 ette tunnel and to the east of those winzes, what was the width of that barren zone of limestone?

A. The barren zone of that limestone that I recollect of testifying to, extending from R to Z, a distance of about 240 feet, and extended in a southeasterly direction, as I lay the ruler.

Q. Now, take the letter W on that map on the Champion incline, which is the same as the Richmond incline, did you not find a body of ore?

A. On the surface?

Q. No, not on the surface; in the Champion tunnel.

A. In an incline extending down the Champion tunnel to a level corresponding to the level 36 feet in this direction from the Lawton tunnel, there was a body of ore as represented on the map; not exactly on the level, but 20 or 25 feet from the level.

Q. And that at that time you knew of the Champion ore-body there, worked out as you have now represented, didn't you? The Champion croppings, ore-body there, ore-chamber.

A. I did.

Q. Now, wouldn't the ore at the point W, and the ore in that Champion chamber be within the body of limestone extended to the surface that you have testified to as being a barren zone?

A. I think my testimony commenced at the point R and the point Z; if so, it would be beyond that body of ore.

Q. It is a barren zone beyond that point, but not a barren zone up to the surface?

A. I was testifying as to the ore from R to Z, extending in the southeasterly direction.

634 Q. And if the same body of limestone had extended up to the surface it would have embraced those ore-bodies which I have called your attention to on the map?

A. The ore-bodies are away below this 36-foot level I have testified to, sir. The ore-body you speak of below W is below to the west of W.

Q. Is lower in level?

A. Lower in level.

Q. Well, is not it in the body of limestone between those two east and west points?

A. Well, my recollection of my testimony was this: commencing at R and extending to Z, my testimony was in regard to the belt or zone of limestone extending to the southeast; that is my recollection of my testimony, and not extending to the northwest.

Q. Well, I don't exactly understand your point. If that zone of limestone is extended to the surface, then wouldn't it embrace some ore-chamber that is worked out, as a part of the Champion?

A. If it was extended to the surface, and extended northwesterly, it would.

Q. In the course?

A. Yes.

Q. Mr. Westcoat, on the ninth level of the Eureka Consolidated, from the Lawton shaft, there is a drift running north to the top of a winze that leads down to the tenth. Do you remember that drift?

A. A drift running northeasterly?

Q. Does that drift from 99 F to 98 show any one?

A. None.

Q. None at all?

A. None that I could find.

Mr. Wren.—A little louder, Mr. Westcoat.

A. No ore that I could find.

635 Mr. Thornton.—Q. Does it show ore stains, or bunches of low-grade ore?

A. It shows iron stains at the junction of the main drift.

Q. And not along to 98?

A. Not that I could find.

Q. Did you find any bunches of iron-stained matter along there?

A. None except at the junction; near the junction.

Q. Now, in going down that winze to the tenth level, 100 feet, do you find anything in the winze?

A. It was boarded up tight.

Q. You could not say?

A. And I could not say.

Q. Now, after reaching the tenth level, from 98 to 102, is a drift. Did you see any ore or orey matter in that drift?

A. About 80 or 90 feet from the winze down, you come in contact with a body of ore or orey matter. I took it to be ore.

Q. How near was that to the hanging wall, in the straight drift, there?

A. About 25 feet.

Q. Is that found from the drift, from 101 to 103, that ore?

A. No, sir.

Q. Well, did you pass along the drift from 101 to 103?

A. I did.

Q. Is there any ore in that drift?

A. There is some.

Q. Well, for what extent, and at what point?

636 A. I find orey matter for 50 or 60 feet from the junction, running northwesterly. Then you come in contact with clay or shale; clay, call it, and follow that to the point where the drift connects with the Richmond 5th.

Q. Now, along that shale is there any ore?

A. When I was in there, at one time, I found ore near the shale and in the face of the drift, several inches thick in places.

Q. Now, you say that connects with the Richmond works?

A. Yes, sir.

Q. With which level of the Richmond?

A. Connects with the Richmond works in a drift 31 feet below the 6th level.

Q. What points [Exhibit 1] are marked as the connection where the Eureka comes in connection with the Richmond?

A. At the point where I hold my ruler.

Q. Marked what?

A. 105; at the point where the drift leaves the clay in a direction to the connection, and marked 104.

Q. Well, what did you find between 104 and 105?

A. Limestone.

Q. And no signs of ore?

A. No ore.

Q. Well, did you see any indications of ore; any orey matter?

A. I took no expert notes in that drift. My impression is, it is all limestone.

Q. But you are not positive on that point?

A. That is my impression—that it was all limestone.

Q. From 105 to the top of the winze in the 6th level what did you find?

A Ore and orey matter.

Q. That is, in the Richmond workings?

A. Yes, sir.

637 Q. From at that point marked winze [showing] to what does the winze go down, and what is the depth of it?

A. Well, from the level that we have been describing, where the connection is made, we go up 31 feet to the 6th level, and we go down about 60 or 70 feet.

Q. Please repeat that. "From the level we have been describing," what?

A. We go up 31 feet to the 6th, and down about 70 feet to the 7th.

Q. Now, on the 6th level, is there any ore at that point you reached going up 31 feet?

A. There is, sir.

Q. There is a body of ore there, is there?

A. Yes, sir.

Q. A large body, represented by that? [Showing.]

A. By that map.

Q. Now, as you go down to the 7th level, in the winze you have mentioned, is there ore?

A. There is ore to the 7th level in the winze.

Q. Well, after you reach the 7th level, where does that reach the 7th level? [Showing.]

A. [Shows.] The connection is from a winze to a point 72 on the 7th level.

Q. There is ore all the way down in the winze?

A. All the way in the winze.

Q. Now, in the 7th level as you go out to point 72, follow it out to point 72, is there any ore?

A. Ore about one-third of the distance; about one-half the distance to the 7th level,

Q. From the beginning out to 72, about half of it is ore. Now, at the point 72, along the shale, is there ore for the distance of 25 or 30 feet?

638 A. Well, when I was in there last and made a survey, it had caved so badly, and you could not examine for ore. I saw no ore.

Q. You could not see ore in the top of that drift, as it went 25 or 30 feet along that shale?

A. At one time, when the drift was in about seven or eight feet, I saw no ore; the last time I was there I saw no ore.

Q. Because of the cave; but there was ore, wasn't there?

A. There was ore there.

Q. Well, then, there is ore there for about the length of 25 or thirty feet, from the point 72 to the end of the 7th level.

A. I didn't say so.

Q. Well, is there?

A. There was none when I was there; no, sir. I said for seven or eight feet, or probably twelve feet, I saw ore when I was in there the last time I made the survey, about 30 or forty feet, and I saw no ore, owing, probably, to the cave.

Q. But you had formerly seen ore in there?

A. For the distance of about 12 feet.

Q. Was the appearance of the ore or the presentation of it different from the caving at the different times you were there?

A. Yes, sir.

Q. Now, is there any winze down from the 7th level at that point?

A. No, sir.

Q. Or near there?

A. No, sir.

Q. No opening below the 7th level?

A. Not at that point.

Q. Well, where is the first winze you come to, down from the 7th level—at what point?

639 Q. The winze from the 7th to the 8th commenced at point 70 and terminated at point 80.

Q. Is there any other winze between those two levels, or any other opening between them?

A. None that I have entered. I think there is none there.

Q. Now, in the 8th level, is there any opening from the 8th to 9th of the Richmond?

A. There is.

Q. Where is that, Mr. Westcoat—at the point marked what?

A. There is a winze from the 8th level, where I hold my ruler—point marked 85—that extends down from 30 or 40 feet to a drift that extends to 86. Then there is a winze extending on perpendicularly to the 9th level, connecting with the 9th in a drift at 94.

Q. Mr. Westcoat, in going from the 9th level, at the point 94, downwards, through what do you pass?

A. I have never been down that.

Q. At the point 93, have you been down?

A. I have.

Q. What did you pass through?

A. I passed through the ore from the 9th level.

Q. What distance?

A. For about 42 feet.

Q. Then what course did you take?

A. Then I took a southeasterly direction, through the ore-chamber, a distance of 31 feet to winze 94.

Q. Then did you go down winze 94?

A. When I was there there was no way to get down. I never was down there.

Q. You have never been down winze 94?

A. No, sir.

Q. From the bottom of winze 93 to the top of winze 94, was there ore or not?

640 A. There was a chamber there, and it appeared to be an ore-chamber.

Q. What did you say was the depth of the winze 93, at the time you went down?

A. 42 or 43 feet.

Q. What is the difference in level between that point 42 or 43 feet, below the 9th level of the Eureka, and the point marked 67?

A. A difference of 27 feet.

Q. Mr. Westcoat, is there ore in the winze from the 8th to the 9th that you mentioned just now in the Richmond?

A. Not all the way; no, sir.

Q. There is some ore in it?

A. Some ore; yes, sir.

Q. A body of ore disclosed in that winze?

A. Some ore in the winze, marked 85, and some ore which has been taken from above it. In a portion of the winze I think there is no ore. In the drift from this point [showing] to 86 there is very little ore. When I went through there, I went through for the purpose of making a survey, and took no expert notice. That is my recollection; and then from the bottom of the winze 86 to the point 94, on the ninth level, there is no ore.

Q. Then, is that ore in any way connected with the ore-body or any of the ore-bodies represented on the map here as a part of the Richmond mine?

A. No developments show any connection.

Q. Well, how far distant is it from the nearest ore on the same level? Estimate it.

A. Are you speaking of the winze, where it starts from the eighth?

Q. Yes, the ore that is found there, in that winze, from the eighth to the ninth.

641 A. There is no ore found on the eighth level.

Q. Well, in the winze you said there was ore found. I don't know where it is. I am asking you to state it.

A. I say there is no ore found on the eighth level at any point.

Q. Well, how far would it be in any direction from any ore-body that you know there?

A. It would be a hundred feet or more horizontally, and about 100 feet perpendicularly from any ore discovered.

Q. Mr. Westcoat, did you pass along from the end of the ninth level, from the ore-body at the end of the ninth level of the Eureka to the workings of the Richmond?

A. I did.

Q. Did you find any ore between that ore-body and the place where we come to the workings of the Richmond?

A. Some ore; very little.

Q. Well, is there a continuous tracing of ore along there?

A. There is not.

Q Did you look for it?

A. I did.

Q. And did not find it?

A. No. sir.

Q. But you found some ore in spots, from place to place?

A. I found mostly sand, which appeared to be drifted in.

Q. Well, what was the color of that sand?

A. Brownish yellow.

Q. Did you have it assayed?

A. I did not.

642 Q. You don't know what it would assay; pretty much the color of ore, isn't it?

A. It is different material.

Q. I am just speaking of the color.

A. Lighter color than most of the ore. There is some ore like that.

Q. It is about the color of ore, then, and if you count that orey matter, there would be a connection from that ore-chamber to the point where we connect with the Richmond workings, would there not?

A. There would; calling that ore which I designated as sand, and following that, there would be a connection.

Q. Calling that orey matter; now, passing down, that represents 59; and the winze you pass down into the Richmond?

A. Yes, sir.

Q. Is there ore down that winze?

A. There is some ore down that winze.

Q. Now, at the point 69, does the drift coming out from the Potts chamber reach the quartzite?

A. It does.

Q. Is there any ore upon the quartzite at that point?

A. The point where the winze connects?

Q. No; where the winze first strikes the quartzite at 69 D, where the drift or level first strikes the quartzite.

A. The level don't strike the quartzite at that point.

Q. Well, where does it strike it?

A. The level strikes the quartzite at point 60, where I hold my ruler.

Q. Well, is there ore upon the quartzite at that point?

643 A. There is not, sir.

Q. Was that the point that was marked 69 D on your other map?

A. No, sir; it was not. 69 D is marked 69 D at the winze the same as it is marked on this map [showing].

Q. Well, is there any ore on the quartzite at that point, at 69 D?

A. There is.

Q. Now, then, from 69 D back to 60, what does that Richmond drift follow?

A. It follows the contact of the quartzite and limestone.

Q. Is there any ore on that contact?

A. No ore till you reach 69 D, near the winze.

Q. Is there any ore matter along there?

A. None.

Q. Any tracing of any kind?

A. Contact between——

Q. [Interrupting.] Is there any ore stains or iron stains along there?

A. I think not, sir.

Q. Not for that entire distance?

A. That is my impression.

Q. Did you have any material from there assayed?

A. Never did.

Q. From 60 in the stopes, is it in ore or not?

A. The ore don't reach to point 60; a distance there of, I think, 20 feet between 60 and the ore—no orey matter.

Q. Next to the quartzite?

A. Yes, sir.

Q. Then the ore extends from a point 30 feet from 60 to the stopes, does it?

644 A. Yes, sir. That country in there from near 60 has all been caved and timbered up, and holes or drifts bored through, through which parties can get. It is very difficult to get through.

Q. When did you first go down in the workings from the 5th ore-body to the 9th ore-body?

A. About two weeks ago; two weeks or three weeks.

Q. How many times have you been through there?

A. A half a dozen times.

Q. When was the first date and when the last when you were down?

A. June 11th was when I made the survey of this—of the chambers marked chamber 11 and chamber 12, and down the winze to point 59; but I didn't go through there at that time. I went through the winze from 57 to 79, and about two weeks ago, proba-

bly two and a half, I went through the connection from 59 to 69 D; then through the 6th level to 69 F, down the winze to 79 G, by the point 79 F, connecting with the 7th level at 79 C.

Q. Now, in following this last course which you have described, from the ore-chamber at 58 to 59, what do you find?

A. I find ore.

Q. From 59 down to 69 D, what did you find?

A. From 59 through the drift along the quartzite at the head of the winze at 69 D, I found a contact of quartzite and limestone—no ore.

Q. And no ore?

A. No, sir.

Q. What distance is that?

A. It is a distance of about forty feet.

Q. Now, from down the winze at 69 D, what do you find?

645 A. I find ore.

Q. Now, down to what point?

A. That was to the 6th level.

Q. What is the distance?

A. 30 or 40 feet.

Q. How thick was the body of ore, how large the body of ore?

A. Well, the last time I was through, the night before I came away, they were excavating the chamber there 16 feet, I think, about 16 feet in diameter, square.

Q. In the ore?

A. In the ore.

Q. And ore you had seen on both sides of the chamber?

A. Well, not much ore.

Q. Did that extract all the ore, or not?

A. It appeared to be about the termination of the ore.

Q. What, on the sides?

A. Yes, sir.

Q. Where was that ore-chamber, exactly?

A. That ore-chamber was exactly over 69 D.

Q. You went down 69 D from that ore-chamber?

A. About 16 feet to the levels.

Q. It extended, then, down some distance towards the level?

A. It came within 16 feet of the level, and was situated about as I make this square [marking on the map] at 69 D.

Q. Now, you followed ore, you say, all the way down to the 6th level?

A. I was on the 6th level, went down a winze to the 6th level.

Q. Did you find any ore on the 6th level?

646 A. All the way from the 6th level on the chamber 69 D to the winze 69 F.

Q. Well, on that 6th level, what was the size of the body of ore?

A. Well, there was the ore-chamber on the 6th level.

Q. You say the drift, the thickness of the body of ore, did you?

A. We found ore on the contact [illustrating], my pencil representing the ore and my book representing the quartzite. The ore was very thick at the 6th level. It took out a foot, probably, at the start, and raising up till they got several feet wide.

Q. In thickness?

A. In thickness.

Q. How many feet wide was the shale in thickness?

A. At point 69 D it was 16 feet wide.

Q. Well, you say you found it way along the 6th level there, from the top of the winze out to 69 F?

A. Yes sir; about a foot wide.

Q. Of rich ore?

A. It appears to be good ore; yes, sir.

Q. Very good ore?

A. Well, very good ore.

Q. And lying on the quartzite?

A. Yes, sir.

Q. Now, from 69 F, down the winze, to what point do you go?

A. There are three connections from the top of this winze to the 7th level.

Q. Well, describe the three.

A. The first connection that was made, and the first I went through, commenced at the top of 69 F and extended down about 50 feet to an angle of about 50; then there was a horizontal drift from the top of the winze extending out into the limestone
647 a distance of about 15 feet; there it turns to the left abruptly, about 15 feet more through limestone, and comes in contact with the quartzite.

Q. Which is there marked with a black line?

A. With a red line; the quartzite is all marked with a red line, following the quartzite down to the 7th level, a distance of 60 or 70 feet.

Q. Now, in that bracing going that course you have described, did you find any ore?

A. I found ore all the way from the winze 69 F to 79 G, a distance of about 50 feet; then through limestone about 20 or 25 feet to the contact again.

Q. You found ore?

A. On the contact.

Q. Well, was there ore in the limestone through which you passed?

A. No ore.

Q. No ore in the limestone?

A. No, sir.

Q. But you found it where you reached the contact again?

A. Yes, sir.

Q. Now, what was the size of the body of ore in that winze from 69 F down to 79 G?

A. Well, the excavation was just large enough for a man to crawl through.

Q. And the body of ore was about that thick—as thick as a man's body?

A. Yes, sir.

Q. It was on the upper side of the winze and the quartzite was below you as you went down?

A. Yes, sir.

Q. And this ore lay right along on the quartzite, didn't it?

A. Laid on the quartzite for that distance.

648 Q. Down to 79 G, and there you passed along through limestone, until you came to quartzite again, and there you found ore?

A. We did.

Q. How far could you trace that ore on the quartzite?

A. Down to the 7th level, a distance of 60 or 70 feet.

Q. What was the size of the body of ore down there?

A. At the 7th level?

Q. Yes; going down on the 7th level from that winze?

A. About a foot thick.

Q. That was very rich ore, was it?

A. Yes, sir.

Q. And laying down to the 7th level on the quartzite?

A. To the 7th level on the quartzite.

Q. Now, you say there were two other connections?

A. Yes, sir.

Q. What were the other connections?

A. The other connections extended down the winze about 40 feet to a point 10 feet above 79 G, and then turned abruptly to the right, following the quartzite to 79 F, and down to the 7th level at 79 C.

Q. Well, what did that expose after you started from the winze along the quartzite towards 79 F?

A. That connection, there is ore all the way.

Q. On the quartzite?

A. Yes, sir.

Q. You followed from the point 10 feet above 79 C to 79 F on the quartzite, ore upon the quartzite and ore from 79 F around to 79 C?

A. I did.

649 Q. Well, what was the size of the body of ore there?

A. Well, from a few inches to a foot thick.

Q. Lying directly on the quartzite?

A. Yes, sir.

Q. Now, then, what was the third connection? The third connection was the one you described in the direct examination of Mr. Wren, wasn't it?

A. There is one connection from the top of this winze [showing on the map].

Q. Well, that third connection, then?

A. The third connection commences at the bottom of the winze from 69 F to 79 G, and extends for about 15 feet, swinging a little to the left of the course of the winze, and at that point I came to a winze up from the 7th, very small; I had to dig my way through and my candle went out, and I could not tell what was there.

Q. So you don't remember that tracing. Now, you describe another connection for Mr. Wren in your testimony-in-chief, from 57 to 79 R?

A. There is a connection between the 5th and 7th levels, touching on the 6th. Commencing at 57 and extending to the cave at 79 J, and reaching the 7th at 79 A.

Q. Well, that you described in your direct examination?

A. Yes, sir.

Q. I won't go into that. Now, from the 7th level down to the 8th, at or near this point [showing], what openings are there?

A. There is but one opening to the 8th in the 7th, that is in this locality [showing on the map].

Q. Well, in this locality, and that is from 79 A to what point?

A. 79 A to 89 C.

650 Q. There is no other opening between the two?

A. No, sir; not when I left the mine.

Q. Was there any other being made or run at that time? Did you see a winze which was going down a certain distance, and one from the lower end of the 8th, going up to meet it?

A. There is a winze extending down from the 7th level off in the direction of the Richmond works and is connected with the Richmond works—the Richmond works on the 4th.

Q. The Richmond works connected with it—rather, did they not run down and strike it?

A. I don't know which.

Q. That is comparatively immaterial; did you go down that winze?

A. I did.

Q. What is in that winze?

A. There is ore in that winze, all the way to the connection.

Q. All the way from the 7th to the 8th?

A. From the 7th level, at the top of the winze marked 79 D, down to the connection which is marked 79 H, there is ore all the way.

Q. Well, what is the distance; what is the depth between those two points?

A. About 75 feet.

Q. Well, is the quartzite visible in that winze?

A. Well, I have been in through that winze three times; the first time I was through there, there was no air, and the candle would not burn; I had to go down in the dark; I went down for the purpose of measuring. The second and third time I was in, it

was to the connection, and the air was so strong I could not keep a light burning.

Reporter.—Louder!

651 A. The second and third time the wind was so strong through the connection, I could not keep my candle burning any length of time, so I could not make a thorough examination, but I think it is on the quartzite all the way.

Mr. Thornton.—Q. That is your impression?

A. Yes, sir.

Q. Now, Mr. Westcoat, from 76 H the only opening is ore until the Richmond works, is it?

A. That is the only opening when I left the mine.

Q. Well, did you go through that opening into the Richmond works?

A. I did.

Q. Through what did you pass going through that opening to the Richmond?

A. Passed through ore.

Q. All the way?

A. Down to the 4th level of the Richmond; yes, sir.

Q. At what point?

A. At point marked 48.

Q. To the ore at point marked 48 on the quartzite?

A. It is, sir.

Q. Is that ore in any way connected with any of these chambers or ore-bodies of the Richmond mine which you have described as the pipe-vein?

A. Not by developments, sir.

Q. Then, how far would 79 H be above the 8th level?

A. 170 feet.

Q. Below the level of the 8th level, how does it compare at 79 H at the bottom of that winze of the 8th level?

A. The 8th level, there would be but 30 feet difference.

652 Q. This is 30 feet higher than the 8th level?

A. Yes, sir.

Q. The bottom of that winze 79 H, now, in going into the Richmond workings at 48 of the 4th level, what is the distance from 79 A to 48?

A. About 75 feet on the incline.

Q. It is inclined about 75 feet?

A. Yes; on an incline.

Q. How steep is that incline?

A. Well, it will average about 40 to 50 degrees.

Q. And it is down on the quartzite, is it?

A. Yes, sir.

Q. And the incline extends down on the quartzite? Well, now,

point 48, where that incline reaches the 4th level, how does that point compare with the level of the 8th level?

A. I just told you, 30 feet.

Q. Oh, 30 feet lower than the 8th level?

A. No, sir; 30 feet above the 8th level.

Q. Point 48 is?

A. Yes, sir. The 4th level is 600 feet, taking the data from the top of the Lawton shaft, and on the 8th level is 630 feet. It is above the 8th level 30 feet.

Q. Now, in that connection from 79 B to 89 C, you say is the only opening between the 7th and 8th level you have passed through?

A. No, sir; I did not say so. I said in that locality.

Q. Well, I mean that point

A. There is one off here [showing on the map], marked 78 to 89 A.

Q. Did you see any other winze going down except the one that connects at 79 H, and the one which begins at 79 B, and the one which begins at 78 connecting those two levels?

653 A. I have been through no other winzes; there may be others, but I have never been through them.

Q. There is none in this locality, at any rate?

A. There is none in this locality.

Q. At the top of 79 H, what did you observe? The winze from the 7th to the 8th.

A. Contact with the quartzite and limestone.

Q. Any ore there?

A. No, sir.

Q. In the drift towards the east from 79 A, did you find any ore?

A. I did not, sir.

Q. Now, along the foot wall to the west or northwest?

A. Along the foot wall to the northwest from 79 A to near a point 79 C there is some ore.

Q. Well, that winze does not start down in ore?

A. It does not, sir.

Q. Well, it goes on the quartzite down to the 8th level, does it?

A. Yes, sir.

Q. Did you find any ore in it at all?

A. I found galena about 25 or 30 feet below 79 A, a little chunk as large as your fist.

Q. Simply one chunk?

A. That is all I could find.

Q. Was not that galena laying in the orey-looking matter, and surrounded by orey-looking stuff?

A. It appeared to be lying in the contact—near the contact.

Q. Well, wasn't it surrounded by orey-looking matter?

A. It might have been; some reddish matter.

654 Q. Couldn't you trace that reddish-looking matter all the way from the 7th to the 8th, along the contact?

A. I could not; it appeared to be a local spot altogether.
Q. That one spot?
A. Yes, sir.
Q. Did you find any other ore below, on the 8th?
A. I did not.
Q. Did you find any ore on the 8th level at any point along there?
A. At a point on the 8th level, near 89 E, where the winze was driven up to connect with the 7th level, there was some orey matter.
Q. Well, did you go up that winze any and look up it?
A. I did not; they were driving it up; the air was bad and it was difficult to get up; there was no ladder and I did not go up there.
Q. It started on orey-looking matter, and that was the only ore you saw on the 8th level?
A. It was, sir.
Q. Now, what openings are there down to the cave from the 8th level?
A. There are two; one a drift commencing at 89 C and extending the level for about 25 feet, intercepting the cave.
Q. Is there any ore in that drift?
A. No, sir.
Q. And one by a drift commencing at 89 C?
A. 89 C, and expanding in a northeast direction about 25 feet, connecting with the cave; and the other commences at 89 F and goes down a winze about 60 feet to the cave.
Q. Is there any ore in that winze?
655 A. None, sir.
Q. It is on the contact, is it?
A. On the contact.
Q. Any orey matter in there?
A. No, sir.
Q. Any stained matter in there?
A. No, sir.
Q. Now, in the cave, Mr. Westcoat, is there any ore in the cave?
A. At a point in the cave nearly above point 90, and about 30 or 40 feet above the 9th level, there is ore and orey matter, the first I saw in the cave.
Q. Is that near the top of the winze that goes up from the 9th level?
A. About 30 or 40 feet from it.
Q. Well, did you walk along in the bottom of the cave and see any ore in the bottom?
A. The cave, when I was first in it, when I first visited it, it was filled. It was filled up with dirt from above, and when I was in it last, about a week ago, it was quite filled up.
Q. So you can't say whether the bottom of it was ore, or not?
A. I cannot.
Q. Was the top full of ore, or not?
A. I found no ore in the top.
Q. Did you pick out specimens of ore from the top?

A. I could not get it out from the top; the top was 20 feet above.

Q. You mean by looking up that 20 or 30 feet you did not recognize it to be ore?

A. I did not.

Q. You can't say positively whether it was ore or not?

A. It was covered up by spars.

656 Q. And stalactites hanging down? You can't say whether if that had been dry through it would have shown ore, or not?

A. I don't know what was beyond it; no.

Q. Does that cave rest on the quartzite? Is one side of it on the quartzite, the bottom of it?

A. I think not, sir. I don't think it touches the quartzite at all. It never touched the quartzite at any point where I examined it.

Q. Well, going down from the cave in the winze to the 9th level, is there ore?

A. I stated that there was ore about 30 or 35 feet above the 9th level, at a point nearly over point 90, and we followed through that ore and orey matter to the 9th level.

Q. Was that on the quartzite?

A. Not on the quartzite where we first struck it, but it was on the quartzite at the 9th level, or near the quartzite. I think the orey matter extended to the quartzite in the ore-body on the 9th level.

Q. You stated that upon this model the body of ore found in the 5th level of the Richmond, going to the northwest, or to the west, is not placed?

A. It is not on the model.

Q. That is the body of ore found in the winze from the 8th to the 9th, put upon the model?

A. It is not; it was a small body of ore, and was overlooked.

Q. Is this body of ore which you have described as almost entirely extending from the 5th level, and generally almost entirely upon the quartzite down to 48, placed upon the model?

A. A portion of it is; the chamber 12 and 11 is on the model.

Q. And none of the rest is upon the model?

657 A. No, sir.

Q. Why did you have such a body as that off from that model?

A. It was partly neglect, and partly for the want of time. When we went over the level I was so pressed with my maps that I pointed out all of these bodies, and a part were put on and a part were not; we did not discover it until we put it up; a part of them we have placed on since, and we will put them all on before we get through.

Q. Is the body of ore found in the Champion tunnel at the point 5 on the model?

A. It is not.

Q. Why didn't you put that body of ore on the model?

A. That is another point that was overlooked.

A. I could not; it appeared to be a local spot altogether.
Q. That one spot?
A. Yes, sir.
Q. Did you find any other ore below, on the 8th?
A. I did not.
Q. Did you find any ore on the 8th level at any point along there?
A. At a point on the 8th level, near 89 E, where the winze was driven up to connect with the 7th level, there was some orey matter.
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Q. Was the top full of ore, or not?
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Q. Did you pick out specimens of ore from the top?

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Q. Is the body of ore found in the Champion tunnel at the point 5 on the model?

A. It is not.

Q. Why didn't you put that body of ore on the model?

A. That is another point that was overlooked.

Q. Is the body of ore marked A, in the neighborhood of the winze above the Lizette tunnel, placed upon the model?

A. No, sir.

Q. Why wasn't that put upon your model?

A. That is a difficult matter to put that on. We intended to put them all on, but that was overlooked.

Q. Is that ore-chamber "G" upon your model?

A. I think not, sir.

Q. Why was that body of ore not put upon your model?

A. I will see whether it is or not [examining model]. Yes, sir; that is upon the model.

Q. Does that represent the ore-body in the west end of the 9th level of the Eureka?

A. Yes, sir.

Q. Does that represent its entire size?

A. Yes, sir; that represents the full size of it.

Q. It represents the size laterally?

658 A. It represents the horizontal dimensions.

Q. It does not represent the size up and down as you have represented the size of the Richmond ore-bodies, does it?

A. It don't represent the size up and down, for I had not surveyed at the time this model was made, except 40 feet down. So I could not put that in, unless it ran clear down to the lower level.

Q. The ore at the top of the 10th-level winze is not placed upon this model, is it?

A. No, sir; for the reason that there is not any there.

Q. Didn't you testify there was some in that drift?

A. I said there was stained matter at the junction, but not at the levels.

Q. It is not put on at the junction?

A. We put no ore-bodies on, unless they were of some dimensions. In the first place we didn't intend to put any ore-bodies on, except those that were generally known. After we extended them out, as we were requested to do so. A large number of ore-bodies in the Richmond are not ore. It was partly overlooked, and partly from their insignificance.

Q. Because not connected with the main pipe?

A. No, sir. The 9th level of the Richmond is not represented on the model.

Q. On the 9th level, and starting from the bottom of the Richmond shaft, you passed what distance in quartzite?

A. About 80 feet.

Q. After you passed into the limestone from the quartzite, how far do you proceed before you reach a body of ore?

A. I found no body of ore on the 9th level.

Q. Did you find any ore on the 9th level?

659 A. No, sir.

Q. None at all?

A. No, sir.

Q. Did you go down there and look for it?

A. I was down there making surveys; not looking particularly for ore.

Q. You cannot state whether there was any there or not?

A. No, sir.

Q. Do you pretend to say that all of the bodies of ore which have been disclosed in the workings, and lying between the Richmond pipe and a plane drawn from the Lawton shaft, are placed upon this model?

A. No, sir; I do not pretend to say it, but I do say it positively. Those of any importance. There might have been a chunk of ore as big as your fist that was not placed on the model.

Q. Are there not all through that body of limestone isolated bodies of ore in every direction?

A. I cannot tell you.

Q. Don't you find a great many?

A. I find some small bodies of ore entirely disconnected with the main body.

Q. Haven't you found some quite large bodies of ore disconnected with all other ore-bodies?

A. That I could not say, because they might connect in some way, or by some development that I was not able to go through.

Q. That is, you don't know of any connection?

A. It was through no connection. The ore-bodies do not connect with any other ore.

Q. You said that this was what you called, in the Richmond, a pipe-vein?

A. It is what some of the authors describe a pipe-vein or a segregation.

660 Q. Did you ever see a pipe-vein, if this is not one?

A. I have never examined a pipe-vein as described in the book.

Q. What authors have you read describing a pipe-vein?

A. I have read Jukes and Von Cotta.

Q. Any others?

A. I don't know whether any others.

Q. What does Von Cotta describe a pipe-vein to be?

A. My recollection of Von Cotta's description of the pipe-vein is an irregular body of ore extending into the earth indefinitely; that is, indefinite in width and depth. That is the general description.

Q. Does Von Cotta make a diagram, showing what these pipe-veins are?

A. I think so.

Q. Does he tell where those pipe-veins are found?

A. Yes, sir.

Q. Where?

A. I don't recollect.

Q. In what districts, or what parts of the world?

A. I don't recollect; my time has all been employed in getting at the facts of this case, and I have had no time to speculate upon theory. I have been after the facts, and I have not posted myself in regard to that matter, but simply make that statement, because I can not tell you anything I don't know.

Q. You stated that it was a pipe-vein, from what you had read in Von Cotta [book shown the witness]. Is that the diagram that Von Cotta draws, to show what a pipe-vein is?

A. I think there are other diagrams.

Q. If that represents the various veins, which are the pipe-veins represented there?

661 A. That does not correspond with my idea of a pipe-vein.

Q. If this [book shown witness] is a diagram which Von Cotta has drawn to show, would it be like this vein or not?

A. It would not.

Q. Von Cotta describes a segregation in the forepart of his book?

A. I believe I said that the vein corresponded in some particulars to the veins that Von Cotta designated as segregation or pipe-veins; that, I believe, was my statement.

Q. Now, does not Von Cotta describe those pipe-veins as being found in Derbyshire or Cornwall? Isn't it those districts from which the name pipe-vein comes?

A. I am not thoroughly posted on that subject.

Q. I understood you to say yesterday what the derivation of the word was?

A. You did not understand anything of the kind.

Q. It was shale you were describing?

A. Yes, sir.

Q. I understood you to say, then, that those were pipe-veins. This Richmond vein is not a pipe-vein?

A. I don't say so; I say that this vein does not correspond with that diagram in all particulars.

Q. In what particulars doesn't it correspond?

A. In its various branches. That diagram shows different strata of ore, one lying above the other, and not connected; one main pipe and several other pipes horizontal to it above and below; I don't find anything of that character in this vein.

Q. You understand from that diagram, then, that the pipe-veins are veins going down from the surface?

662 A. Irregular in their form, in some places large, and other places extending some hundred feet laterally, and in other places quite small.

Q. But if in that diagram the author represents the lateral or horizontal bodies of ore between the stratification of the rocks to be the pipe-veins and the other the rake-veins, you are mistaken altogether as to whether this is a pipe-vein or not?

A. According to his definition, yes, sir.

Re-direct examination by Mr. WREN:

Q. You say you have read Jukes?

A. Yes, sir.

Q. He is an English author, isn't he?

A. Yes, sir; I believe so.

Q. The pipe-veins are described as veins found in England and in Ireland, are they not?

A. Yes, sir; that is my recollection.

Q. The description contained in Jukes is very much more full than that in Von Cotta; that in Von Cotta being exceedingly short?

A. Yes, sir.

Q. When was this model made?

A. It was made before the first anticipated hearing in this case—about two months ago.

Q. Developments have been going on in these mines, or at least in the Eureka Consolidated and the Richmond, ever since the model was first made, haven't they?

A. Yes, sir.

Q. Both companies pushing explorations for the purposes of this trial?

663 A. Yes, sir.

Q. And the model, after it was first made, was boxed up and stored away?

A. Yes, sir.

Q. Your work, in order to get your map done, has compelled you to employ another party to assist in putting the model up?

A. Yes, sir; and in putting the additional work on it.

Q. And didn't the man you employed put most of the additional work on?

A. Yes, sir; he has put it all on—nearly all. And putting it all on from the map, which contained all of these works, and he not being familiar with them, I would point out certain things for him to put on, and he would overlook it.

Q. Then the way in which the matter came to be overlooked, that are not put on, was from the fact that you had to have another party put them on for you, and he occasionally overlooked one?

A. Yes, sir.

Q. When was the model put up, and the new work put on it?

A. On Saturday and Sunday last. It was put up on Saturday, and the new ones were put on it Sunday. I worked all day Sunday on it.

Q. You had been instructed to put everything on the models that appeared in the workings?

A. Yes, sir; and anything that is left off came through omission, not intentionally.

Q. You spoke about finding small bodies or bunches of ore in this ground that have not been placed on the model. Did you find any very great number of those bunches?

664 Q. Taking Mr. Read's on model, in a great many, what proportion of limestone is shown between the shale and the quartzite, in proportion to the ore found?

A. There is a very large proportion; I don't know how much.

Q. Please examine a few of the plates of his model, and measure them, so as to tell.

A. About 2,000 feet of limestone to one foot of ore, taking the first plate as a sample.

Q. Did you tell Mr. Thornton that you found no ore in the cave above the 9th level?

A. I didn't state so. At the point 35 feet above 90 I found some ore, and traced it down through into the 9th level.

Q. Above that point did you find any ore in the cave?

A. No, sir.

Q. Did you find any ore in either of the winzes, from the c up to the 8th level of the Eureka?

A. I found no ore in either of the winzes, from the cave t the 8th level of the Eureka.

Q. Did you find any ore from point 39 C to 89 E on th level of the Eureka?

A. I did not, except what was found in the vicinity at the of the winze.

Q. Did you find any ore between 79 D and 79 A on the level of the Eureka?

A. There is ore on the 7th level of the Eureka from 79 D to C.

Q. And from 79 C to 79 B what is it?

A. No ore. There was a bunch of ore about the size of the dri at 79 B when I first visited it; and it was taken out, and coul not be seen there now.

665 Q. What is the distance from the ore found in 79 D to the 8th level of the Eureka where you find any ore?

A. It is about 100 feet perpendicular, and about 80 feet horizontal.

Q. In what direction does that ore dip that you find from ore-chamber 11 on the 5th level of the Eureka Consolidated down to 79 D?

A. We don't trace those continually to that distance.

Q. In what direction does the ore dip that you do find between those two points?

A. In nearly a west direction.

Q. Nearly at right angles with the ore that you find at the end of the 9th level of the Eureka?

A. Yes, sir.

Q. It does not dip towards the ore-body that is found to the 9th level of the Eureka?

A. No, sir; it dips at right angles, or away from it.

Q. What distance is there between the point at which the ore

669 truck in the 4th level of the Richmond, to the main Richmond body or pipe?

A. Following the development, and about 150 feet.

Q. In that distance you find no ore.

A. No, sir.

Q. That is driven through solid limestone, is it?

A. There are ore indications just before you get to the quartzite way.

Q. 4th level, where the 4th level pierces the ore.

A. ese developments, as far as they have gone, show that the surface, and ound at the northwest end on the 5th level, neither con- down for abo he ore-body found at the northwest end of the Eureka would dip se with the main ore-bodies found in the Richmond 7th level or th?

Q. No developments showing that they do connect.

Do not the developments show that they do not con-

A. Yes, sir.

Q. ow that they do not connect. There are no develop- the Richmond g that they do connect.

A. No. sir. u, last night, make out the list of dips of the quartzite

Q. d, that I requested you to make?

ir [reading]: commencing at the Eureka 5th level, at nearest poi where the winze extends down to the 8th level, I find, workings t west 32 feet; south 50°, west 27 feet, to winze up in ore;

A. uth 75°, west 23 feet to ore stope; thence south 40°, west

Q. Of t o winze; south 42°, east 6 feet; south 21°, west 60 feet, Richmon mze; north 38°, west 20 feet, D 54°; thence down winze,

A. T 8°, west 12 feet, D 30; thence north 27 feet, D 50.

Q. S he Eureka 6th level, across the body of quartzite, commence- the 6th the end of cave, thence north 85°, west 27 feet; thence north betwe west 25 feet; south 41°, west 55 feet; south 51°, west 36 feet.

A he Eureka 7th level, across the quartzite, commencing at winze quartzite; thence north 6°, west 20 feet; thence north 20°, west 67 3 feet; north 62°; west 21 5-10 feet; thence down winze north 25°, west 32 feet, dip 45°.

The Eureka 8th level, course of quartzite, commencing at drift to cave; thence north 79°, west 26 feet; north 34°, west 15 feet; thence north 53½°, west 18 feet, to down winze; north 53½°, west 24 feet; north 35°, west 31 feet; north 40°, west 28 feet, to winze up.

Q. Do you or not recollect whether you ever testified to any particular width that this barren zone had, running through here?

667 A. I think not; no width unless we would take the width between the points that I have named in the testimony.

Q. Isn't your testimony to this effect: are not certain points designated on each level of the Eureka; and were you not asked what you found between those points?

A. That is my recollection of my testimony.

Q. Is that what you testified to?

A. Yes, sir.

Q. That between those points there was nothing but barren l
stone found?

A. Yes, sir; that is my recollection.

Q. And then you testified generally that this barren zone ext
all of the way through, between the Richmond pipe and the E
ing the pipe, in a northeast or eastern direction?

A. So far as these developments show, I could not testify the
thing else.

Q. Isn't there a barren zone apparent now, taking th
ments between these two pipes of ore, commencing at
and running all the way down, narrow at some points
ing out as you descend into the earth?

A. There is.

Re-cross examination:

Mr. Thornton.—Q. Did you ever testify that there
pipe-vein?

A. I don't recollect of ever testifying to anything

Q. Is there such a pipe-vein in this ground as the
or do those bodies of ore found in the Eureka K. K. wo
pose a pipe-vein?

668 A. I have found no connection or anything tha
pipe-vein.

Q. When Mr. Wren asked you what was the distance
stone between the Richmond pipe-vein and the Eureka p
what did you mean in your answer?

A. I drew my conclusion from what I supposed he meant and
Q. The bodies of ore in the Eureka end, over to the L
shaft, are so disconnected that you cannot call them a pipe-ve
A. I have not called them pipe-veins, and I should not call t
a pipe-vein of any kind.

Q. Because they are so disconnected?

A. Yes, sir.

Q. Laying separate about in every direction of the limestone?

A. Yes, sir.

Q. What is the dip of the shale from the surface, as represented on that map, down to the lowest workings of the Richmond?

A. We don't find the shale represented on the surface.

Q. From the surface down to the shale, in the last workings of the Richmond; that is the dip of the shale?

A. The shale of the surface is not the shale found below.

Mr. Thornton.—Q. In the lower workings of the Richmond?

A. No, sir; it is not the shale at all.

Q. What becomes of this shale at the surface?

A. It dips under the overlying body of the limestone, which is represented beyond these.

669 Q. What shale is that found on the 7th and 8th levels of the Richmond?

A. I don't pretend to say.

Q. But it is of different kind of shale from this?

A. Yes, sir. This shale at the surface is lying more easterly than the shale lying 800 feet below it; and they both dip the same way.

Q. Can't they change their dip between those points?

A. Yes, sir. We know that this shale which is found on the surface, and throughout which the Richmond shaft is sunk, extends down for about 300 feet. That dip was regularly to the east, and would dip several hundred feet easterly of the shale found on the 7th level or the 6th.

Q. Therefore, you conclude that the shale of the 6th, 7th, and 8th levels is a continuous level.

A. Yes, sir.

Q. Now, the quartzite dips are represented on our model under the Richmond working shaft, doesn't it?

A. No. sir. It cuts through it.

Q. The Richmond working shaft cuts through that quartzite. Now, what is the distance on the 7th level of the Richmond, at the nearest point between the quartzite and this shale, that is cut in the workings to the north of the shaft?

A. Do you mean the shale on the surface?

Q. Of the shale that is found on the 6th and 7th levels of the Richmond?

A. That is not to the north of the shaft.

Q. Some distance between the quartzite and the shale found in the 6th, 7th, and 8th levels of the Richmond, at the nearest point between the two?

A. Are you speaking of the quartzite cut by the Richmond shaft?

670 [Question repeated by reporter.]

A. Of course, it cut on the 9th level of the Richmond, distant 200 from the quartzite cut on the 6th level of the Richmond; 200 feet horizontal and 200 feet perpendicularly. And the distance between the quartzite cut on the 7th level of the Richmond and the same shale found on the 7th level of the Richmond is 280 feet; the quartzite on the 7th and the shale on the 7th.

Q. Does that shale and clay quartzite come together, as they go down? As the dip of each was, they would approach each other as they went down.

A. From the quartzite on the eighth level they are 310 feet apart; on the seventh level they are 280 feet apart, showing that they are diverging, instead of converging, as they go down.

A. But you have taken a point on the eighth level, which at the farthest working where the shale has been turned, according to your testimony, towards the northeast, haven't you?

A. The shale on the eighth and seventh levels is on the same course; almost exactly the same course.

Q. Where is the quartzite nearest to the shale at 72 on the corresponding level? What distance is it from the point 72?

A. The nearest place we can find on the corresponding level is 350 feet. That is, quartzite on the ninth level of the Eureka.

Q. Does that quartzite and shale dip at those two points, so that they approach each other, going down?

A. At some points they do, and at some points they do not. Sometimes they dip easterly, and sometimes westerly.

671 Re-direct examination:

Mr. Wren.—Q. Does the ninth level of the Eureka Consolidated correspond with the seventh level of the Richmond?

A. No, sir. That is the nearest corresponding level that I can find of the shale at the end of the seventh level.

Q. The seventh level is about 200 feet lower than the ninth level of the Eureka, isn't it?

A. No, sir.

Q. What is the difference; 170 feet?

A. The ninth level of the Richmond is 900 feet below the dip of the Lawton shaft, and the ninth level of the Eureka is 730 feet, making a difference of 170 feet.

Q. Then, no measurement taken between the quartzite and the shale on those two levels would give a correct idea of the distance they are apart at that point?

A. No, sir.

Q. The shale diverges from the quartzite, going to the northwest rapidly, doesn't it?

A. Yes, sir.

Q. Is this the description of pipe-veins that you refer to in testimony [reading from the work of Jukes]?

"A pipe vein in the north of England is described by Foster as a 'huge, irregular cavern, pushed inward into the body of the earth 'in a slanting direction, sometimes running between the bodies, 'when these veins are a little inclined; and in other places bursting 'through the ore-body and through the strata."

Did you read that description?

A. Yes, sir; and that is the vein that I intended to describe.

672 Q. Did you read this also? "It may always be difficult to 'prove that pipe-veins are not connected with some fissures 'which may or may not be a rake-vein, but so far as the evidence goes, 'they seem to be mere cavernous spaces excavated out of the rocks 'in the same way as other caverns; and afterwards to have become 'receptacles of ores."

A. Yes, sir.

Q. And still further on the subject of pipe-veins of a similar nature, from Jukes?

A. Yes, sir.

Re-cross examination by Mr. THORNTON:

Q. Does Jukes represent pipe-veins entirely in stratified limestone?

A. I don't recollect as to that.

Q. Can that be be any other kind of rock except stratified rock?

A. I think not.

Q. Then there is no stratified rock here of that nature?

A. This is all stratified rock, or has been once, and is a part of it now.

Professor J. D. WHITNEY, called for defendant, and sworn.

Mr. Wren.—Q. What is your profession?

A. Geologist; mining geologist, especially.

Q. How long have you been engaged in the study of your profession, and particularly as mining geologist?

A. Forty years.

Q. The mines of what countries have you examined during that time?

673 A. The mines of all of the countries of Europe, except Turkey and Spain; and all of the Eastern States east of the Mississippi river; and also in Nevada and California.

Q. Have you visited Eureka recently?

A. I have.

Q. For what length of time did you remain there?

A. A week.

Q. And you were engaged during that time in examining Ruby Hill, and the properties in dispute in this case?

A. Exclusively.

Q. How would you class the Richmond vein, found on Ruby Hill?

A. I would call it a pipe-vein.

Q. In what rock is that vein situated?

A. Limestone.

Q. From your examination, what kind of limestone would you call it?

A. Ordinary limestone.

Q. Is or is not the body of that hill composed of magnesian limestone?

A. It is not.

Q. What are the characteristics of pipe-veins?

A. The pipe-vein is an expression used in the north of England to describe the peculiar form which the veins of lead take on there in the limestone. It was first used there, and has since been extended to other countries. It is used to designate ore in any considerable irregular cavity, having more or less flat places in it, like a series of caves connected together, but which go down generally in the form of a pipe, or an elongated hollow vein, so to speak.

Q. In what kind of rocks do the lead deposits of the Mississippi valley occur?

A. They occur in the dolomite and limestone.

674 Q. Is there any difference in the forms of the ore-bodies or lead occurring in dolomite and any other kind of limestone.

A. Not necessarily. The variation of the form in the lead regions depends upon the thickness and fixture of the rocky channels. Both kinds of form occur in both kinds of rock.

Q. Do you know of any reason why ore-bodies should have a different form in dolomite from the form they have in limestone?

A. No, sir; I do not.

Q. Is it a fact that ore-bodies that occur in dolomite differ substantially in form from those that occur in other limestone?

A. Not that I know of.

Q. From an examination that you have made of the mines of Ruby Hill, what is your opinion about all of that process of limestone lying between what is called the clay seam, near the mouth of the Bell-shaft tunnel, and the quartzite, being all lode?

A. It is the country rock which contains the veins and lodes.

Q. You don't consider it one load, but simply as the rock containing the ores?

A. I have not.

Q. What is an impregnation?

A. Do you mean as a mining term?

Q. Yes, sir.

A. I never use the word myself; but if it meant anything, it would mean a portion of rock somewhat impregnated with ore, I should imagine. It is not a word in common use, as far as I know.

Q. What, as a mining term, does the word stoke-work mean?

A. Stoke-work is a German word applied to workings

675 somewhat common in Germany, where the whole mass of the rock is filled with ramifying veins, so that the whole mass has to be worked together; but the veins have to be taken out with the whole mass of the rock.

Q. Did you make up your mind in regard to the proper name to be given to the ore-bodies in the Eureka and K. K.; or did you examine sufficiently for that purpose?

A. You will see considerable resemblance between the two; and I would say that the Eureka was not as well developed a pipe as the Richmond, although it is of the nature of a pipe-vein.

Q. There are a class of ore deposits found in and near the line of contact of dissimilar forms, and particularly in limestone that are separated from each other by the country rock containing them; they do not seem to go to any great extent of depth in any direction. That class are denominated segregations, are they not?

A. That is a name in common use for any mass of ore which does not seem to have any regularity. It is a very indefinite term.

Q. There are such occurrences of ore and particularly of iron ore?

A. Yes, sir; they are abundant.

Q. Do you recollect whether you examined the shales which appear in the levels of the Richmond, or not?

A. I looked at them; yes, sir.

Q. Did you examine them for the purpose of determining whether the shale turned off at this point, marked 71 and 74 on the model?

A. I saw those points there.

676 Q. Did you examine the cross-cut driven to the northwest on the fissure on the 9th level, not far from the point where the end of the 7th level cuts the shale?

A. I did.

Q. Has that fissure any connection with the shale, or not?

A. Not that I know of.

Q. Did you see any clay in that fissure?

A. I did not.

Q. You passed through several of the levels of the Eureka Consolidated and of the Richmond, didn't you?

A. Yes, sir.

Q. What did you find generally in these levels, between the ore-bodies?

A. I found a barren zone of ground.

Q. Of what kind of rock?

A. Of limestone.

Q. Did you find any considerable amount of brecciated limestone?

A. No, sir; not much.

Q. Did you find any very considerable proportion of the limestone stained with iron or iron stains?

A. No, sir.

Q. It was simply plain, barren limestone, was it?

A. Yes, sir; almost entirely.

Q. Did it appear to be a solid limestone, or was it more broken up than limestone ordinarily is, in a state like that?

A. Not more broken than limestone frequently is entirely distinct from any appearance of lodes?

Q. Did you find any fissures in the working of the Richmond Company descending into the earth?

A. I did.

Q. What would you call those fissure-planes that you saw there, or fissures?

677 A. Fissures, or fissure-planes.

Q. Are they, in your judgment, the walls of a lode, or is the fissure a fissure containing lodes at the point where they are found?

A. They are the fissures which have given origin to the lode, and which are essential to the formation of the lode.

Q. Do you regard the fact that a little ore is found penetrating

those walls occasionally as militating at all against the theory that they are the walls of the lode?

A. Not at all.

Q. Is it common to find ore extending for a short distance in the walls of the lode, and sometimes for considerable distances?

A. It is.

Q. From your examination, is it your opinion that the croppings that appear at the Champion are the same as those that appear on the Eureka 5th level, or not?

A. I could not say, sir.

Q. Did you form any opinion about that at all?

A. I did not. I saw the croppings were very superficial.

Q. Are not pipe-veins found in granite?

A. They are.

Cross-examination of J. D. WHITNEY:

Mr. Thornton.—Where?

A. In Cornwall.

Q. Where else are pipe-veins found?

A. All over the world, for all that I know. They may be found in any kind of rock.

Q. Where do you know of their being found?

678 A. They are found in the north of England, in Nevada, in Cornwall, and in Derbyshire.

Q. In the north of England, in what districts?

A. In the mining district of Derbyshire; and in Cornwall, the most recent and important discovery of tin is in granite, in a pipe-vein.

Q. Is there any other ore but this found in Nevada?

A. I have heard of others, but I have not seen any other.

Q. Where did you hear of any other?

A. I have heard them frequently spoken of as occurring in Nevada.

Q. At what points?

A. I cannot designate the points.

Q. In what districts did you hear of them?

A. I didn't take a note of the names or districts.

Q. Are those the only points in the world that you can name where pipe-veins are found?

A. Those are the most important ones, and the ones which I know particularly about.

Q. Did you visit those in England?

A. No, sir; but I had an opportunity to study them from a most magnificent model exhibited in 1851, at the exhibition in London, which gave the whole features of every part of the district.

Q. And you have never seen any pipe-veins but this one in your life?

A. I never saw ore so perfect as that. I have seen pipes of ore

frequently in the lead regions, but never a great pipe-vein before seeing this.

Q. Are pipe-veins ever found without having some connection with other veins?

A. Most certainly. There is no reason why they should
679 not be. In Cornwall they are not connected with any other veins, so far as I know; it is entirely isolated.

Q. In what work is that vein described?

A. By Foster, who is the mining inspector for the Cornwall district.

Q. Where can I find that described?

A. In my library.

Q. In what book?

A. In a separate pamphlet. I think it has been published in the Transactions of the Royal Cornwall Geological Society.

Q. What is the name of the pamphlet?

A. The name of the author is Leveve Foster.

Q. What is the name of the pamphlet?

A. A description of that mine.

Q. Have you read it lately?

A. Yes, sir.

Q. Did you bring it out here with you?

A. No, sir; I never thought of it until about five minutes ago, when somebody asked me about pipe-veins in granite.

Q. In your book entitled "Metallic Wealth of the United States," did you mention pipe and flat veins?

A. Yes, sir.

Q. Do you remember what you said about them?

A. I alluded to them as occurring in the north of England, and gave a regular description of them, compiled from the information I had.

Q. Did you say, in describing them, "The pipe and flat veins are masses and sheets of ore subordinate to the principal veins?"

A. Yes, sir.

Q. But in some instances they are of sufficient extent to be quite productive?

A. Yes, sir.

680 Q. What principal vein is this pipe-vein subordinate to?

A. To itself. It does not follow that the pipe-veins must be subordinate to other pipe-veins. If the word had not existed in the language, I would have invented it on seeing that vein.

Q. How does that represent a pipe?

A. You can see for yourself in the section that it does represent a pipe—an irregular string of cavities going down an irregular tabular line of ore.

Q. Where is the bowl and where is the stem?

A. Gone up in smoke, I suppose. Where is the bowl and stem

of a base pipe? It is not a tobacco-pipe that is being spoken of. It is a pipe without the tobacco.

Q. What kind of a pipe is this like? Why would you have named it a pipe-vein?

A. Because it is an irregular, continuous mass of cavities connected together—swollen into a somewhat circular form usually.

Q. Is such a description as you have given of it like a pipe?

A. It is like a pipe-vein.

Q. Why would you call it a pipe-vein? Because it is like a pipe?

A. Because it is a more or less continuous circular pipe, like a continuation of ore.

Q. Is this circular?

A. It is circular, but it flattens in places. It is much more circular than other veins. It tends to a circular form, instead of a usually elongated form.

Q. This is more circular than flat, is it?

A. It is more circular than flat, compared with other veins. You must recollect that those terms are all more or less indefinite.

681 In mining it is very difficult to apply terms exactly where the forms of the bodies of ore change so much. I should say that was a typical pipe-vein.

Q. A typical pipe-vein?

A. A typical pipe-vein; and I shall describe it as such hereafter.

Q. Do you mean that it conforms to the description of a pipe-vein by authors who have written upon that subject?

A. It comes most nearly to the ideal of a pipe-vein.

Q. Does it come most nearly to the idea of a pipe-vein as described by Von Cotta?

A. I don't know anything about Von Cotta describing a pipe-vein. I don't know that he ever saw one.

Q. Does it conform to the pipe-vein of De la Bache?

A. I don't think he ever studied the subject at all. I don't know that he ever saw one. It corresponds to Mr. Juke's description.

Q. Don't you know that Mr. De la Bache was a geologist of and for that very district where pipe-veins occur?

A. No, sir; he was the geologist of Cornwall and Durham. These were not discovered until quite lately.

Q. Then, is there any other writer who has written about a pipe-vein and given a description that you can name, except the pamphlet of Mr. Foster?

A. Yes, sir; you will see pipe-veins alluded to in all of the descriptions of English mines. There is Stockwith and Wallace, two of the principal authors.

Q. Do these descriptions describe typical pipe-veins?

A. If they do not, they ought to.

Q. Do they, according to your memory?

682 A. I think they do.

Q. Is it from those authors that you have derived your idea of the typical pipe-veins?

A. No, sir; from the model I referred to. It was the grandest model ever constructed in the world.

Q. Your ideas are derived simply from that?

A. Almost entirely from studying that; and from Wallace's book also.

Q. Does Mr. Wallace's book describe that vein?

A. Wallace gives sections of all the veins. His descriptions I don't care about.

Q. Does he describe what pipe-veins are?

A. I don't know whether he does or not.

Q. What book of Wallace's is that?

A. A treatise on the laws which regulate the position of the lode, or ore in the vein.

Q. Your only idea of a typical vein, so far as you have seen it described, is derived from Wallace's book, from that model, and from Foster's pamphlet?

A. And this mine—I would have invented the word "pipe-vein," after seeing this mine, if it had not existed.

Q. I will present Mr. Wallace's book to you, and try to get you to point out his description.

A. I have not said that he said a word about pipe-veins; but he has sections of all the mines there, and I can show you which is a pipe-vein.

Q. Who mentioned Mr. Wallace's book in the first place?

A. I did.

Q. Why did you mention it, if not as describing it as a pipe-vein?

A. Because you asked me whereabouts it was that I got my knowledge of the geology of the country.

683 Q. And I also asked you about a pipe-vein. See if you find anything in that book of Wallace's [showing] that he describes as a pipe-vein.

A. I don't say he has; I said he had given sections of the pipe-vein; where I got my ideas.

Q. Show us the section that shows the pipe-vein.

A. All of the sections more or less illustrate the country where the pipe-veins are found. Here is where the pipe-veins originate.

Q. You have told us that this was a typical pipe-vein. I understood you to say that you derived your idea of a typical pipe-vein from Wallace's book?

A. No, sir; not exclusively.

Q. You named that as one of the books?

A. Yes, sir.

Q. Please show to this court where in that book you find anything about a pipe-vein—from which you draw that idea.

A. From all of the sections. Every section in the book has it,

more or less. They all throw light upon the geology of the country where pipe-veins were first described.

Mr. Thornton.—We offer Mr. Wallace's book in evidence at this point.

Q. How many pipe-veins are there in this belt of limestone between the Richmond and the Jackson?

A. I don't know.

Q. Did you examine the underground workings of any of the mines except the Richmond?

A. Yes, sir; and the Eureka.

Q. Did you go into the K. K?

A. No, sir,

Q. Do you say that you found a pipe-vein in the Eureka?

684 A. I did not. I said that I found what I presumed may be called, from analogy with the other, a more or less imperfectly-developed pipe-vein. If I knew how the ore lay in the wall originally, I believe that I should find that that was a pipe-vein also.

Q. Did you see on the surface the ore-chambers through which the Champion croppings had been extracted?

A. I did.

Q. And the Buckeye?

A. I don't remember the Buckeye.

Q. Did you go through all the levels of the Eureka Consolidated?

A. Partly—nearly all, I think.

Q. Which levels did you go through?

A. I went through all of the important levels, I believe, so as to get a general idea of the mine, especially in levels running through the barren ground; that is what I paid particular attention to.

Q. Can you name the levels that you went through?

A. I went through all of the upper and center part of the mine, to get a general idea of it.

Q. Walked hastily through?

A. Sufficiently to get a general idea of it.

Q. How many days were you under the ground in the Eureka Consolidated?

A. One day; four or five hours.

Q. That is the only time you went through these workings?

A. Yes, sir.

Q. How many days were you in the Richmond?

A. About three days.

Q. How many hours a day did you spend down there?

A. Four or five hours a day.

685 Q. And you were not in the K. K. or the Jackson at all?

A. I was not.

[Here the court takes a recess until 2 o'clock P. M.]

AFTERNOON SESSION.

TUESDAY, *July* 31, 1877.

Testimony of J. D. HAGUE—direct examination:

Mr. Wren.—Q. What is your profession?

A. Mining engineer.

Q. Where were you educated for the profession?

A. I commenced my studies at the scientific school connected with Harvard University, Cambridge. I pursued them afterwards in Germany, partly at the University of Gottengen and partly at the School of Mines, Saxony. This occupied from 1854 to the beginning or to near the end of 1858.

Q. After you had finished your studies, did you enter practically on the pursuit of your profession?

A. I did.

Q. In what position?

A. Returned to the United States. My professional business was to go to the South Pacific ocean for the purpose of making surveys and explorations on the islands down there. I came to California in 1861. I spent two months here examining mines of gold and quicksilver. In 1863 I went to Lake Superior and engaged as superintendent of copper mines; and while there I had something to do in the examination of iron mines. Subsequently I spent some time in making various examinations in the West Indies and in
686 the states—in the Eastern States of the Union—in 1867. I became connected with the United States Geological Survey of the 40th parallel, under the direction of Clarence King. I was for three years or more engaged in the field-work of that survey, chiefly in the examination of mines of Nevada, Colorado, and some in Utah. I was also engaged in the preparation of one of the volumes of the report of that survey. I resigned my position in that survey in the beginning of 1871, and since that time have been mostly on this coast, resident in San Francisco, and engaged in the profession, examining the mines of California, Nevada, Utah, Colorado, Arizona, Mexico, and in other places.

Q. Since you completed your studies there, you have been practically and constantly engaged in the practice of your profession? Ever since?

A. Almost all the time.

Q. And are now so engaged in the practice of your profession?

A. Now so engaged.

Q. In this and adjoining states and territories?

A. Any where.

Q. Has most of that time been spent in the examination of mines?

A. Much of the time has been spent in the examination of mines and the preparing of reports, etc.

Q. Have you examined the Eureka Mining District, and particularly the Richmond and Eureka and K. K. and Jackson mines?

A. I have examined all those mines except the Jackson.

Q. What length of time have you spent in examining the Eureka and Richmond and K. K?

A. Altogether I should think about ten weeks.

687 Q. In daily or almost daily examination of the various workings of those mines?

A. Constantly, while there.

Q. Did you assist Mr. Westcoat in making most of the surveys or many of the surveys that he has made of these mines?

A. I did.

Q. Was your examination very careful of every portion of those mines to which you had access?

A. I endeavored to make them so.

Q. Did you take very accurate notice of everything you observed in the various workings of those mines which you examined?

A. I endeavored to do so.

Q. Is the map that is posted on the wall familiar to you?

A. It is.

Q. You understand it?

A. I do.

Q. That is Exhibit No. 1. Is the surface map of the Richmond and adjacent mines on Ruby Hill sufficiently familiar to you to enable you to designate the points on it?

A. I think it is.

Q. Are you well acquainted with the glass model of the Richmond, Eureka, and K. K. mines?

A. I am.

Q. That has been put in evidence?

A. Yes, sir.

Q. Are the two maps and the model correct representations of the workings, so far as they appear—so far as they appear on the maps and models?

A. I believe them to be so in all essential particulars.

688 Q. Do you know the clay seam that is shown in the Bell-shaft tunnel and Utah incline?

A. Yes, sir.

Q. Do you know the clay seam that has been developed in the second and third levels of the K. K. mine?

A. I do.

Q. Are you acquainted with the shale that has been developed at the top of the Richmond shaft and in the 7th and 8th levels of the Richmond Mining Company?

A. Yes, sir.

Q. In your opinion, is the clay in the Bell-shaft tunnel and Utah incline the same as that found in the K. K?

A. I doubt it.

Q. What is the distance between the clay seam near the Bell-shaft tunnel and the Utah incline, from the clay seam that is shown in the K. K. workings?

A. Well, to be precise, I would have to measure the map.

Q. Approximate it.

A. Several hundred feet. The map shows those almost exactly. I would have to measure in order to reply in detail.

Q. In your opinion, is the clay seam shown in the Bell-shaft tunnel and in the Utah incline, the same as the shale cut in the 10th level of the Eureka Consolidated and in the 7th and 8th levels of the Richmond Mining Company?

A. I think not.

Q. Why do you think they are not the same?

A. Because the clay seam in the Bell-shaft tunnel and the Utah tunnel seem to me to be mere local occurrences.

689 Q. On what does the shale appear that appears in the Eureka?

A. That seems to be a large body of shale, different in appearance and character, I believe, and not local. It is not local in the sense in which I use the word with reference to the Bell-shaft tunnel and the Utah. I do not know the extent of either further than it is developed.

Q. You are well acquainted with the ore-body that crops out on top of the Tip-top incline and extends down from the 8th level of the Richmond, are you not?

A. Yes, sir.

Q. What name would you give that ore-body, scientifically speaking?

A. Well, if I had to give it a name I would call it a pipe of ore; that ore-body.

Q. Does it answer nearly the description of pipe-veins, with which you are familiar from the books?

A. It answers very well the description of those veins, and it agrees very well with the idea I have formed of pipes of ore from my reading.

Q. For what reason are such veins called pipe-veins? On account of the peculiar form of the vein, or on account of the mode of its origin?

Mr. Justice Field.—You state your judgment and then ask the witness if he concurs with you.

Mr. Wren.—I know. It is not the usual way in which examinations are conducted, but Mr. Thornton and myself agreed, in order to shorten the examinations, that we would waive objections to such questions.

Mr. Justice Field.—If the counsel do not object the court will not.

690 Mr. Wren.—It was our agreement, for the purpose of saving

time, that we might put questions in this form to the witness—leading questions—without objection.

Mr. Thornton.—Only this: If your honors please, it goes to the credit of the witness, that the witness adopts the words from the mouth of the counsel, instead of giving testimony directly for himself.

Mr. Wren.—Only upon agreement would I indulge in such examination. We knew that it would be a long, tedious trial, and that it was desirable to shorten it as much as possible. The question was, or would have been—no, I believe I did not finish it. I will ask you this question: Whether pipe-veins are so called on account of their form or the mode of their formation?

A. I understand them to be so called on account of their form.

Q. And not on account of the mode of formation?

A. I do not know but that the mode influenced it somewhat, but the form is the chief reason for their being so called.

Q. What is your opinion in relation to the ore-bodies that are found in the Eureka claim?

A. I think they are analogous in their mode of formation to that of the Richmond. They do not form so well-defined a pipe or lode, but I think their formation is analogous to that in the Richmond.

Q. What is your opinion about the mode in which these different ore-bodies were found on deposit from any source from which they came?

Witness.—Q. You mean of the Richmond?

Mr. Wren.—A. Yes, sir; of the Richmond first, and then others.

691 A. I think the ore-body of the Richmond is a true formation of a fissure or a system of fissures in the country rock of limestone. I find there are a lying and underlying body of quartzite, followed by a body of limestone, and afterwards a body of shale, which has already been described. And in the Richmond, in this limestone, we find evidence of fissure, which may have been produced at the time of the uplifting of these bodies into their present position, or by some other force. And along the line of this fissure, which I traced for some distance and on various levels, I found the ore-body or a series of ore-bodies, the origin of which I take to be due entirely in this instance to the formation of the fissure, and to the subsequent introduction into this fissure of ore-bearing material, in the form of vapor and solutions, which have enlarged these chambers and have deposited in them the ore where we now find it.

Q. What is your impression about the formation of ore-bodies found in the rock?

A. My judgment in regard to the rock is the same. I cannot find in the Eureka so clearly a connected fissure, or system of fissures, as there is in the Richmond. But I find lines of fissures traversing the limestone in the Eureka mine, connected more or less clearly with the beds of ore. But arguing from the very clear

development in the Richmond, it seems to me that the ore-bodies in the Eureka have had a similar source. That is to say, they are bodies connected with a fissure or system of fissures which occur in the limestone, and which rest upon the quartzite.

Q. In your opinion, how many fissures are there? And is there more than one fissure to which these ore-bodies owe their origin?

A. Are you speaking of the ore-bodies of both mines?

Q. Yes, sir; I am speaking of the ore-bodies of both mines.

692 A. I think there are two fissures or two systems of fissures—two separate systems of fissures—one of which formed the Richmond ore-body, and another which forms these bodies of rock on the K. K.

Q. Why do you conclude there are two fissures or two systems of fissures forming the different veins?

A. Because, in the Richmond, we can trace what I call a very well-defined fissure in the limestone, nearly from the surface down to the bottom, on the different levels, of course all of which would appear to lead it from the direction of the shale or from the northwest over to the southeast towards the quartzite. Between that fissure or system of fissures there is now quartzite, a projecting cape or ridge of fosse, and the rock fissures I find on that side of that cape, as illustrated on the model. Here is our ridge or quartzite, the tracing of which may be seen here on the 9th level, and, turning here in the K. K. [pointing], making a sort of ridge or groove or trough in the quartzite; and in that trough I find a system of fissures; on the other side I find the other system of fissures, and between the two is a belt of barren ground, which lies upon this projecting cape—quartz that divides those fissures.

Q. Running?

A. Running in a northeasterly direction—that is, on the dip of the quartzite.

Q. What is the general direction of the fissures that you find in the Richmond claim? Taking all the points that you observed a fissure at, the average course?

A. The average direction would be about north 45 or 50 degrees west.

Q. South of east, of course?

A. Yes, sir.

693 Q. What is the direction of the fissures that you observed in the Eureka Consolidated or K. K., connecting with the ore there? That presents more variety, but the average would be a little more east and west?

A. Perhaps north 60 to 65 degrees west.

Q. Did you carefully examine the country lying between the croppings at the top of the Tip-Top and Richmond inclines to the ore that has been worked at the surface of the Champion claim?

A. Yes, sir.

Q. What did you find lying between those two points?

A. Barren limestone.

Q. Did you find any croppings on the line between those two points?

A. I think not in a direct line. There are one or two spots of croppings or irony material off the line. I don't think they would be on a direct line between those two points.

Q. Do you find any of those croppings on the ledge a short distance to the southeast of the Richmond claim?

A. Yes, sir, I do; I remember one of that sort.

Q. Describe that—its size and character.

A. It appeared to be a small seam lying near the ridge, down near the ridge, where the body of the rock had been taken away for grading. I should judge its exposure to have been, perhaps, two or three feet long, in a horizontal direction, and perhaps a few inches in thickness—a sort of seam or clay there in rock.

Q. At other points did you find any appearance of ore or ore-body or irony material off the line between those two claims or croppings?

694 A. I think I remember a small hole on the side of the hill just upward—up the hill from the line connecting these two points—where there was a little iron cropping out.

Q. Do you recollect the name given to that?

A. No, sir; I don't recollect whether it was named or not.

Q. You recollect another small spot up there?

A. Yes, sir.

Q. What is the character and size of it there?

A. There was scarcely anything there. Some one had commenced to dig a hole there for some purpose, and seemed abandoned, whatever may have induced him to begin it. There was a little space of limestone and iron there.

Q In your examination did you find those little spots of irony matter on the surface of limestone quite common in that district, not connected with any lead, or has your examination not been sufficient to determine that?

A. You find some on that hill, more or less. I don't remember any more there than this which I have mentioned. Unless it be a very light cropping at this Virginia Iron shaft.

Q. What did you find lying, cropping out, at this Virginia Iron shaft?

A. I think there is something there. But there was nothing at the dump which I saw that came out. But I believe there was some iron oxide near the large shaft.

Q. About what was the size of it?

A. Something very small, if my remembrance of it is correct.

Q. How large?

A. A few inches, perhaps. Hardly that. A seam.

695 Q. Commencing at the top of the Tip-Top incline, going

down from the various winzes and stopes to the lowest portion of the Richmond mine, what do you find?

A. Coming down to the Tip-Top incline you enter the underlying limestone of the Tip-Top. That incline, I was told, was driven for the purpose of raising ore out of the adjoining body, which had been opened by the Richmond incline. So that that runs in the underlying foot wall—limestone. And by several boundings it connects with the old ore-body. The old ore-body has long since been worked out. I came through that Tip-Top incline at one or more or several points, into the old ore-body, and saw the stopes there, and passed down through a portion of that cave ground that had been lately re-opened, so as to pass down through the continuous body of the stope ground, from which there had evidently been a large body of ore removed. Continuing down to the level of the Lizette tunnel you go entirely through ore, or through stope ground; and from the Lizette tunnel or the Rossiter incline down through several chambers, it sometimes dips at an angle of 35 to 40 degrees; and then making a flat floor. Then dipping again at a steeper angle, we come to the level of a flat chamber, which is 70 feet above the 200-foot level—vertically, about 70 feet above the 200-foot level.

Mr. Justice Field.—Is that called the first level?

A. There is properly no first level. The Lizette tunnel may have some such name. This is called the flat chamber.

Mr. Wren.—This is the map of the plaintiff. I think we have it marked more fully in our map [showing].

696 Witness.—This was the top of the Tip-Top incline. It passes down this way, giving access to occasional points of the ore-body that was worked out through this incline, connecting or——

Mr. Wren.—[Interrupting]. That is intended to show the line of intersection. That has not been put in evidence yet.

Witness.—Yes, sir. This ore-body goes down to this point, where that ground is covered [pointing]. By passing down the Tip-Top incline and passing through this level, I gained access to this part of the chamber and gained access to this point here.

Mr. Wilson.—Unless the names of the points are given the reporters cannot get down the testimony intelligently.

Mr. Wren.—They have no names marked there.

Witness.—There is a flat chamber. And this is the Rossiter incline here. Passing down through this stope of ore [pointing]——

Mr. Justice Field.—[Interrupting]. That is the first level?

Witness.—There is properly no first level, properly so called. Passing into this flat chamber, which makes a horizontal prolongation of the lode, in the direction of the dip, the distance there is something over 200 feet. Then, in passing down through the winze or the bottom of it, at the 200-foot level, it is marked 24, and reaching the second level there, having passed through a vein of ore, it is in

brown stope, probably too low-grade ore for that purpose. And it connects with this bottom—the flat chamber connects with the 200-foot level, the second level. And in that second level I found a vein of ore extending from somewhere about the point marked 20 to there [pointing], extending from the neighborhood of this
697 winze, somewhere along here [pointing], and then passing down the winze connecting the third level with the fourth—from 23 to 30. In that winze there is a small seam of ore traceable by the ore. And the winze follows the line of the fissure, what we have called a fissure-plane. This also runs into the second level, running by the front line of the second level. This winze follows that down to the 3d level. On the 3d level that same line of fissure is there distinctly marked, and is traceable here for 150 feet or more. From this great cone to this end of the drift, there is also ore visible along that level and in connection with that line of fissure. And from the 3d level to the 4th level, from point marked 35 to point 40, there is another winze which I passed down, following a distinctly-marked line of fissure as before, and carrying ore along with it, although in some places very small indeed, and reaching the 4th level, where the fissure-line is still visible, and where it connects with the caved ground and stopes—stopes that were made some years ago. Following the 4th level [pointing] through the drift as shown here on the map, and upon the caved ground, it extends in this direction to the point 43; I find an ore-chamber there. And there is a connection with the ore—the ore stopes—on the 5th level. Passing down through this ore, examining that for a length of perhaps 300 feet, I passed down to the 6th, through ore stopes; and from there to the 7th, through ore stopes. And from the 7th I passed down through 20 feet more of stopes, and there I came to a seam too small for stoping. Following that seam down to the 7th level, it still remains traceable in a very small, thin seam of ore.

698 Mr. Justice Field.—So from the croppings you trace the ore of the pipe-vein clear down to the ground—to the ground in dispute?

A. Clear down to the ground in dispute.

Mr. Wren.—Just describe what you found in the working through the several winzes from the Margaret down to the ore-body at the end of the 9th level of the Eureka Consolidated, in your own way. Let me give you that from the map [defendant's Exhibit No. 1]. We will have this tracing finished up and furnished your honors by to-morrow morning, so you will have a perfect idea of the workings.

Mr. Justice Field.—What I want to ask is, could you not trace a vein also from the Margaret, where they are working the ore, down to the ground in dispute?

A. Not through the ground I have passed through; but I have not seen the last developments.

Mr. Justice Field.—What I want to get at is, whether, assum-

ing there are two pipe-veins through there, both go down to the ground any deeper.

Mr. Thornton.—That was the testimony of Mr. Westcoat, this morning?

Mr. Wren.—No, sir; that was not the testimony of Mr. Westcoat, this morning.

Mr. Thornton.—I am quite as positive as Mr. Wren can be to the contrary, that Mr. Westcoat followed those workings for hundreds of feet, and said it was rich ore from place to place.

Mr. Wren.—I do not propose to argue that at the present time. Mr. Thornton states that Mr. Westcoat testified that he followed that quartzite for hundreds of feet on ore; I merely meet that assertion by stating my contrary remonstrance of the testimony, of course, and we can argue that when we sum up the case.

699 Q. I understand you to say, in reply to the question of his honor, Judge Field, that you could not trace the ore from the Margaret down into this Richmond pipe or ore. Will you just, in your own way, explain to the court the examination you made of that ground and the workings that you passed through in making that examination?

A. I passed through this winze here from 57, and passed through this winze here at the northwest end of the Eureka 5th level, down towards the 6th and 7th levels.

Q. From the different points as they go along?

A. From 57 to 79 J.

Q. From 57 to 59 J this winze follows closely the contact of quartzite and limestone?

A. As I remember it the body of the winze or excavation is wholly down out of the quartzite, the plane of contact being, as it were, the roof of the winze; in this contact the quartzite is generally soft. That is why the winze is widened at this place. But the limestone is hard. All the way down from 57 to the cave, there is a clear close contact, without a visible sign of ore. This cave is in the quartzite, or at least it is close to the contact, I suppose. But there is quartzite in the roof of the cave, that is to say, on this upper side. A portion of this that comes down this 6th level—I think all of 14 feet—is timbered up, so that it cannot be seen exactly, so I cannot say there is no ore there; the body to that point is in quartzite. Continuing in that winze, it is mainly in quartzite; but near the contact, and from there down to 79 A, I saw no ore.

Q. What did you find from 75 A to 79 B?

A. That is, on the level?

700 Q. What did you find in the winze from 79 down to the 5th level of the Eureka Consolidated?

A. That winze follows nearly the contact of quartzite and limestone. I passed through the winze and saw no body of ore. There may have been occasional spots of ore. My attention was called at

one time by the foreman of the Eureka to a spot that looked like ore, but I was hanging on a rope and could not use my pick to advantage, and deferred a further examination until ladders should be put in.

Q. You found there what appeared to be one spot of ore in that winze. What was the extent of that spot of ore?

A. Very small, a few inches perhaps. I noted occasionally signs of ore—not much—closely near the bottom, which was near the end of this rope I was hanging to.

Q. What did you find in the winze from the 8th level of the Eureka, in the cave about the ore-body at the northwest end of the 9th level?

A. Which winze?

Q. There is but one, that seems to be a level?

A. That is a level which comes in. That place I have not been through. I have not seen that.

Q. What did you find in the level driven from the 8th level of the Eureka Consolidated to the cave above the ore-body, and the northwest end of the 9th level?

A. Limestone.

A. Any ore?

A. No.

A. What did you find in the cave above the ore-body and the northwest end of the 9th level?

Q. I passed down from this level here near 89 C on this map; I passed down a winze near the contact on quartzite and lime-
701 stone, where I saw no ore until getting down in the cave. Passing through the cave and down ladders to, I should think, within 30 or 40 feet of 9th level, we came into ore, and passed down through ore to the 9th level.

Q. What did you find on the 8th level of the Eureka, from the point marked 88 to the point marked 89 C?

Q. Limestone. The drift is in limestone part of the way and part of the way in limestone and contact, or limestone and quartzite.

Q. Did you find any ore between those points on the 8th level of the Eureka?

A. If you will allow me I will find out directly [examining notes]. The first part of that cross from 88 to 89, or nearly 89, is in barren limestone without any ore. Near 89 the ground is reddish, red irony material, showing what might be termed indications of ore. It then follows the contact. It follows that contact to the point you named.

Q. Is their any ore in the point of that contact or any indications of ore?

A. There is no ore. There may be indications of ore. I found oxide indications.

Q. Is there any oxide?

Q. There is some iron oxide.

Q. At what point?

A. Between 89 and 89 A.

Q. For the balance of the way what is the character of the ground?

A. It is a contact of quartzite and limestone, and sometimes shale, a close contact with the material, resting close upon it.

Q. Is there anything to indicate a vein or lode, in your judgment, between the quartzite and limestone?

A. No.

702 Q. You consider stains of oxide of iron as an indication of ore?

A. Yes; it may be considered indications of ore. I do not consider them ore.

Q. Pretty much the whole distance shows indications of ore, does it not?

A. It shows iron oxide.

Q. The quartzite is deeply stained with iron oxide, is it not?

A. Yes, sir.

Q. I will ask this question wholly, whether you always consider the stains of oxide of iron as an indication of ore-bodies in the vicinity?

A. No, sir.

Q. Do most of the rocks contain iron in small proportions?

A. Yes, sir.

Q. Wherever that iron exists, wherever it has an opportunity to oxidize, it would result in iron stain?

A. Yes, sir.

Q. Did you examine the cross-cut driven to the northeast from the ore-body at the northwest end of the Eureka 9th level?

A. Yes, sir.

Q. What is that cross-cut driven in?

A. After leaving the intersection of drifts at the turn-table, perhaps for 30 feet, passing beyond the limits of the ore-body developed there at that part of the level, it is mainly in grayish limestone.

Q. What is the character of the limestone for compactness and hardness?

A. Hard contact.

Q. Does it show any stains of oxide of iron?

A. I don't think it does.

Q. Do you find any ore at all in it?

703 A. I do not.

Q. Your shoulder was dislocated before some of the later developments were made?

A. Yes, sir.

Q. So that, upon your last visit to the Eureka, you were not able to visit the new developments?

A. No, sir; I was disabled.

Q. What developments have been made in the Margaret, and from there downwards?

A. From the last time I was able to visit the Eureka mine, this winze here at 58, in the northwest end, had just been started, and I went down that winze for perhaps 50 feet, following a good seam of ore down upon the quartzite for, I think, perhaps 35 or 40 feet, and then a smaller and less distinctly traceable seam, to the vein-bottom, where there was still more ore. I also saw their developments upon the 5th level, perhaps not so extensive as they now are indicated, but I saw the body of ore upon the quartzite, and was up in this chamber here, where the ore had risen from the quartzite into the limestone—at least I found no quartzite up in the chamber there with ore resting upon it. The rest of these winzes here have been made since my last examination of the mine, and I know nothing of them, except from hearsay.

Q. Did the ore that you saw in the winze at 58 dip towards the ore-body in the 9th level of the Eureka, or not?

A. It did not.

Q. In what direction did it dip?

A. It dipped towards the northwest—in a northwesterly direction.

Q. In what direction does the ore-body dip at the northwest end of the Eureka 9th level?

704 The quartzite on which it rests dips in a general way to the northeast.

Q. So that the dip of the ore-body in the Margaret and the dip of the ore-body in the northwest end of the 9th level of the Eureka is nearly at right angles?

A. The dip of the underlying quartzite is nearly at right angles.

Q. Had the 8th level of the Eureka Consolidated from 89 C been driven to 89 E at the time you were there?

A. No, sir; driven, I think, to about 89 B; I can tell in a moment [examining notes]; from 89 C the drift had been driven to 89 D; that was the last point I saw; it shows a remarkable, clear contact, hard limestone, undecomposed, spany in places, and resting upon softer quartzite, in which the drift was cut; very clear, close, well-defined contact without a sign of vein or fissure.

Q. What is the appearance of the contact between the limestone and quartzite throughout the workings of the Eureka, wherever you have examined them, as to vein or lode, appearance, or lack of it?

A. In general, the quartzite is rather soft, dipping or crossing about as shown on the map, and in places it is so soft that it is timbered up, and the contact is concealed by timber. In general, however, it is a close contact of occasional seams of iron—that is chiefly where the ground is soft—or iron oxide, and occasionally black seams said to be manganese, and which may be. In general, the contact is close and without any ore or vein, or sign of fissure.

Q. From your examination of the line of contact, wherever exposed in the Eureka works, would you say that this is, or is not, a contact vein at the point of contact?

705 A. I should say there is not a contact vein.

Q. Do you find ore at some points resting on the quartzite in the Eureka?

A. Yes, sir.

Q. To what do you attribute the finding of ore on the quartzite?

A. I think that the fissures which have caused the ore, being mainly in the limestone, have extended towards and to the quartzite in places, and at such points contact deposits have naturally resulted between the limestone and quartzite.

Q. Let me see whether I clearly understand you. I understand you to say, in the opening of your testimony, that the fissures ran diagonally across the limestone?

A. Yes, sir.

Q. Towards the quartzite and shale on either side?

A. Yes, sir.

Q. Your idea, as I understand now, is, that running in that course, the fissure occasionally reached to and touched the quartzite?

A. Yes, sir.

Q. And where that occurred a deposit of ore was the result?

A. A deposit of ore might be the result, and sometimes is.

Mr. Justice Sawyer.—What is a contact vein?

A. A contact vein is a vein which is formed as the contact of two formations, as between quartzite and limestone.

Mr. Wren.—Let me ask you this question: Suppose a vein like the Comstock was found lying between the syenite and prophy-
706 lite, through a portion of the course of the vein and entirely in it, part of it lying in other portions of the vein, what would you call that portion that lies between the prophylite and syenite?

A. I would call that contact.

Q. What would you call that portion of the vein that lies entirely between the walls of the prophylite and the iron that extends in it, and the prophylite?

A. I would call it a fissure and vein, if there were a fissure there.

Q. Would you call it a contact-vein in any sense in which that term is used?

A. No, sir.

Q. I understand you to say that there was a barren zone of limestone lying between the ore-bodies found in the plane of the Eureka Consolidated, and ore-bodies found in the Richmond. About what is the general width of that barren zone?

A. It appears to be longer in depth than it is on top; near the surface it is probably three or four hundred feet, but it gets wider as it goes down; and at the 9th level I should say it is several hundred feet—500 or 600, maybe more.

Q. You find one going into the Eureka Consolidated at several points, do you not?

A. Yes, sir.

Q. Do you recollect at what points you have noticed the water coming in?

A. There is in the 9th level a bulkhead in one of these cross-cuts. I think it is that cross-cut there [pointing]. It is between the angle of the drift and 99 D; a cross-cut to the northeast. I think in that cross-cut there is a bulkhead, which I saw had been put up to keep the water back. In this cross-cut here, which is between 99

707 D and 99, running through the quartzite and beyond the contact and quartzite, and not the limestone to the northeast, there is a considerable stream of water running in there.

Q. Where does that water flow to?

A. To the Lawton shaft, as far as I could see.

Q. Did you observe them running the water from the Lawton shaft?

A. Yes, sir.

Q. Do you know how much deeper the workings of the Richmond company are than the workings of the Eureka?

A. The 9th level of the Richmond are about 270 feet below the 10th level of the Eureka. But how deep the works of the Eureka go below the 10th level in this new development here at the northwest end, in that winze 94, I do not know. They may go below the 10th, for aught I know.

Q. Are the works in the 10th level in the Eureka Consolidated lower than the cross-cut or cross-cuts in the 9th level of the Eureka, through which the water flows?

A. Probably 100 feet lower.

Q. Are the lower workings of the Richmond wet or dry?

A. They are dry, generally.

Q. How do you account for the fact that the water is found in considerable quantities in the workings of the Eureka Consolidated, and not in the workings of the Richmond, which are considerably lower?

A. Well, I suppose there may be some barrier between the two; that it finds an easier outlet to the 9th level, and towards the Lawton shaft, than it does this way.

708 Q. Do you think it is any proof of fissure connection between the Eureka Consolidated and the works of the Richmond, and the solidity of this barren zone which you have spoken of, which passes through there?

A. I think it is a strong indication, not proof.

Q. Have you examined the surface of Ruby Hill carefully, or not?

A. With considerable care.

Q. Of what sort of limestone is the hill, in the main, composed?

A. Common limestone.

Q. Did you see any considerable amount of dolomite on Ruby Hill, or in the mines?

A. Nothing that I knew to be dolomite.

Q. What was your judgment in regard to it?

A. I do not think it is dolomite.

Q. Can the quartzite and limestone be easily distinguished in those mines by observation and inspection?

A. Yes, generally; one may be mistaken sometimes.

Q. What method did you adopt for the purpose of distinguishing between quartzite and limestone found in the various workings of the mine?

A. Inspection, trial, by testing, by hardness, where the rock was not too deeply decomposed to make that a useless means, and finally by acid.

Q. Did you find it necessary in some cases to employ acid in order to determine whether the rock was or was not limestone or quartzite?

A. I do not always find it necessary, but we take the precaution.

Q. You were in the K. K. third level at several places?

A. Yes, sir.

709 Q. Do you find any ore resting on the quartzite in the K. K. claim?

A. There is some ore resting on the quartzite, a little above the third level, in a winze that goes up from the 3d level.

Q. For what distance?

A. In a horizontal line. It may be that I saw it for 60 feet; I was told by the workmen it went farther, but there was so much smoke I could not pursue the inquiry.

Q. Did you find any portion of the underlying rock of that ore-bed limestone?

A. Yes, sir.

Q. You found it sometimes resting on the quartzite and sometimes on the limestone underlying?

A. Yes, sir.

Q. Did you find any considerable ore-bodies resting on the quartzite, and from this one place?

A. In the K. K?

Q. Yes, sir.

A. There was ore touching the quartzite between the 5th and 6th levels, I believe.

Q. For about what distance?

A. I cannot remember the distance exactly, but for a distance in the winze between the two, and along the levels.

Q. Is it your opinion, or not, that the shale that is formed at the surface in the Richmond shaft and the shale found on the 7th and 8th levels are the same? The Richmond shaft is sunk through the shale, you recollect.

Q. Yes, sir. I think that is doubtful. I am not fully per-
710 suaded about that. The indications are it is not the same. If it were the same there would have to be a reversed dip. I think, also, that is a surface to get to the 6th and 7th.

Q. Can you tell in any way about what dip of the shale is, that appears on the surface to the northeast of the Richmond?

A. The dip at the surface, do you mean?

Q. Yes, sir.

A. The dip is to the northeast.

Q. At about what angle?

A. As I remember it, between 45 and 60 degrees, I should think. I am not very positive about the dip of that on the surface.

Q. Did you ever trace or attempt to trace the shale on the Richmond around toward the Jackson?

A. Yes, sir; I followed it pretty much as indicated on that map. Seeing this line of contact near the Richmond angle, I follow it around through the railroad cut, not exactly at the lines indicated, because the cut is below the line of contact. And so I went through the Jackson mine.

Q. Are beds of intercalated shale common in limestone, thinning out in every direction?

A. Yes, sir; they are not uncommon at all.

Q. You wouldn't consider it remarkable, then, if more than one body of shale was struck in various workings of those mines, some of which might not come to the surface?

A. No, sir.

Q. Did you observe any difference, either on the surface or in the various workings of the mine on Ruby Hill, between the limestone lying between the claycene in the Utah and Bell shaft, or in the Bell-shaft tunnel and the Utah incline, and the quartzite, and that lying on the outside?

711 A. I observed no greater differences between the points you describe than between the various varieties of limestone inside of that belt.

Q. Did you observe many varieties of limestone inside of the belt?

A. Well, a number. Yes, sir; a considerable variety.

Q. And a considerable variety also on the outside?

A. Yes, sir.

Q. Do you find any stratified limestone on what is called the inside of the vein, by the limits of this case? What are the limits of the inside of the vein?

A. They are limits of the claycene which is formed in the K. K., and also in the Bell-shaft tunnel, and shale that is found in the Richmond 7th and 8th. I believe, also on the surface. I found stratified limestone under ground in the 7th and 8th levels of the Richmond, between the quartzite and shale.

Q. Did you examine the outcroppings of the Carson mine, which is southeast of the K. K., where it is opened into the lode?

A. Yes, sir; if I remember the name of the location correctly. I examined the location out there, near the Jackson, somewhere.

Q. You examined a developed hole that had been dug in the ore near the road, did you not?

A. Yes, sir.

Q. What mostly overlies the ore at that place?

A. Limestone.

Q. What was it, stratified or unstratified?

A. There was unstratified limestone in that neighborhood, close to the ore.

Q. For what distance did you trace that stratified limestone running to the southeast?

A. On the surface?

712 Q. Yes, sir.

A. I did not trace it any distance; but I think it might have been one or two hundred feet. I am not sure about that.

Q. Did you or did you not observe a body of shale lying immediately to the east of it?

A. Yes, sir.

Q. A different shale from the shale delineated on the map?

A. I think so.

Q. Did you notice how far it was from this outcrop to the quartzite at that point?

A. From the outcrop of the ore?

Q. Yes, sir.

A. I think it was pretty near the quartzite, but I did not measure it exactly. The quartzite is not far off. The quartzite is [showing in the red] not a great ways from that outcrop.

Q. Is the lime generally stratified or unstratified inside of the lines you have just indicated?

A. Under ground?

Q. Yes, sir; and above ground, too.

A. Inside of the lines, you mean, of the quartzite and the shale?

Q. Yes, sir.

A. Generally stratified.

Q. Did you ever examine the Ruby Hill tunnel?

A. Never.

Q. Never went in there, sir?

A. Never.

Q. How is the limestone on the surface to the northeast of the clay seam in the Bell-shaft tunnel, and between that and the shale, shown on the map?

A. Common limestone.

713 Q. Unstratified?

A. Certainly; generally unstratified.

Q. Are there any evidences of stratification to be seen in that limestone that are not also seen in the limestone between the quartzite and the clay seam of the Bell-shaft tunnel?

A. I think not.

Q. What is the course of the shale between point 71 and 74 on the model?

A. It is only cut at two points. The drift passing in the shale, the line of shale at those two points is hypothetical. The course of the drift—the course where it crosses the drift—I can give you.

Q. Well, give me that course.

A. Very nearly north and south.

Q. And what is its course where it crosses the drift at 74?

A. It is more to the northwest.

Q. Well, it is almost absolutely certain that the shale extends between those two points, from the developments that were made.

A. I consider it certain.

Q. Do you find any shale in the level marked 73, at the 8th level of the Richmond?

A. No. Marked 73?

Q. Yes, sir.

Mr. Thornton—That is the 7th level.

Mr. Wren.—Q. Well, 7th level of the Richmond?

A. What is the question?

Q. Do you find any shale in that portion of the level of the Richmond on the 7th level running through to the northwest from 73?

A. I do not.

Q. Do you find any appearance of shale?

A. No.

714 Q. Find any clay there?

A. No.

Q. Not a particle?

A. Not a particle.

Q. Does that fissure that is shown in that portion of the level connect with the shale at any point?

A. I don't know that it does.

Q. Does it connect at any point shown by developments?

A. Not that I am able to recognize.

Q. Did you endeavor to trace that fissure to the southeast from the point 73?

A. I did.

Q. Well, sir, how far did you trace it?

A. The point you can see. It is a point near 73. From there, looking for it in this other level, where the ore-chamber is, it seemed to have entered the ore-chamber.

Q. And did not?

A. I could not trace it beyond.

Q. What is found between the walls of that fissure?

A. Where there is anything, there is a thin seam of irony matter; low-grade ore.

Q. Did I ask you, Mr. Hague—I believe I did—what the general course of the fissures were that you found in the Richmond?

A. You did ask me; yes. I said in the Richmond they were about north 45 or 50 west.

Q. And the course of the quartzite in the various workings are as shown on the maps and models?

A. I believe that is correctly shown on the maps.

Justice Sawyer.—Q. Are you acquainted with the Comstock?

A. I used to be. I am not very familiar with the Comstock now.

715 Q. What kind of a lode do you call that?

A. I call that a fissure-vein; contact-vein in part.

Q. What is the foot wall composed of?

A. The foot wall is composed of several thousand feet 'long Mount Davidson; it is composed of—partly of porphilyte or porphyry; south of that syenite, and then again porphyry.

Q. What is the hanging wall?

A. Porphyry.

Q. What is the material between these walls that is not ore?

A. Partly barren quartz, partly fragments of the country rock, have intervened between the fissures there. [In answer to a question inaudible] All of one material, yes. There are large masses of country rock which lie between.

Q. Aside from the country rock, was all of that material which is not ore, the quartz and other material, deposited subsequent to the deposition of the matter of the two walls?

A. Yes, sir; I think so. [In answer to a question inaudible.] I suppose the quartz was brought up by solution.

Q. The same time as the ore?

A. Some of it. Some of the quartz is ore-bearing and some is not, and there may have been various periods for its introduction.

Q. Is the whole material quartz?

A. Mainly quartz. There are other minerals in the lode besides quartz. All the material is mainly quartz outside of that which has come from the country rock. Fragments and masses of the country rock.

Q. All that material except the country rock and that which belongs to the walls of the lode was deposited from solution or through heat?

716 A. Yes, sir.

Mr. Wren.—Q. Silica has been brought up in solution at various points in the world, and particularly on this coast at the present time, has it not, Mr. Hague?

A. I think so.

Q. In some form form silica is quite soluble in water?

A. Yes, sir.

Q. And it is brought up from hot springs at one or two places at least in this state, as well as in Nevada?

A. I believe so.

Q. And deposited in the form of a quartz or flint?

A. Yes.

Q. Some of the silica brought up in solution, and deposited in that way, also contains small percentages of the precious metals, does it not?

A. I believe so.

Q. So that we have going on natural causes now that produce similar material to that that fills lodes in the main?

A. Yes, sir.

Q. Then, if I understand your theory in relation to the formation of the Comstock and other quartz lodes, it is that the quartz, as well as the ores, come up from the same source from below?

A. They are introduced in solution, I believe. Whether poor quartz and rich quartz come from the same source, is more than I know.

Q. Well, they come from below, through the fissure?

A. Yes, sir.

Q. That is the generally accepted theory; and usually the metals are found disseminated through masses of the quartz?

717 A. Yes, sir.

Q. Sometimes in paying quantites, and at others not?

A. Yes, sir.

Q. Do you know whether there is any of the quartz of the Comstock that does not contain some small percentage of ore, or not; or do you know whether an analysis has ever been made for the purpose of determining that?

A. I don't know whether there is any absolutely barren, in the strict sense of the word.

Q. The masses of country rock that appear in the Comstock are entirely surrounded by the fissure?

A. I believe so, generally.

Q. And usually by vein-matter, or ore?

A. Generally.

Q. That is, the vein-matter proper; the vein-matter that has been deposited at the same time that the ore was, or nearly?

A. Yes; excepting the clays.

Q. What is the gangue of the Comstock lode?

A. Quartz.

Q. What is the gangue of these mines?

A. If it has a gangue, I should say it was iron oxide.

Q. Masses of country rock on a smaller scale are found in the ore-bodies in this mine as well as the Comstock?

A. They are, certainly.

Cross-examination:

Mr. Thornton.—[Mr. Westcoat produces for counsel the small map that was used on the former trial].

Q. Mr. Hague, you were asked by Mr. Wren just now if

718 there was any stratified limestone within what, upon the

theory of the plaintiff, was contended for as the lode, and you asked him what the theory of the plaintiff was; did you?

A. Not in those words, but I suppose I know what you mean.

Q. Well, what did you ask him?

A. I asked him what those limits were.

Q. Didn't you ask him what the theory of plaintiff was?

A. I did not use that language, sir.

Q. What?

A. No, sir.

Q. You asked him what the limits were?

A. I asked him what those limits were.

Q. Have you written two affidavits in the equity case between these same parties, upon this same issue?

A. I have written two affidavits in this case.

Q. Didn't you know, when you asked Mr. Wren that question, what were the limits that the plaintiff contends enclosed this vein?——

A. [Interrupting]. I am am not sure that I do. No.

Q. You do not?

A. Hardly.

Q. Hardly? Why?

A. Well, I wanted to give it. I wanted to give the answer exactly as I understood him, and that is that there was a stratified limestone between the quartzite and the shale.

Q. Well, didn't you know that we contended that the quartzite and the shale enclosed the lode, as we claim?

A. I beg pardon.

Q. Didn't you know that we contended that the quartzite and the shale enclosed the lode, as we contended for it?

719 A. Yes. I know that, but I have been listening to the evidence, and I did not know whether you referred to the shale or to what I have heard testified to here as shale in the seventh level of the Richmond. My inquiry was simply to get at the question and answer it directly.

Q. You wanted to know, then, whether he was asking about that stratified limestone that is found on the 7th level, and which we contend to be without the lode, and which Mr. Wren and your side contend to be within the lode?

A. I was thinking of that, sir.

Q. That is what you wanted to be certain about?

A. Yes, sir.

Q. You have testified to a barren belt of limestone between what you call the Richmond pipe-vein and the Eureka pipe-vein?

A. Yes, sir.

Q. Now, that barren limestone would have to extend between the quartzite and the overhanging shale, wherever it is in a line across between the Richmond and the Champion croppings, wouldn't it?

A. Somewhere between those.

Q. Now, here is an old map of Mr. Westcoat's [showing map to the witness], which was made for the former trial, which he had testified to.

Justice Field.—The former trial referred to? Is that the trial between the Richmond Company and the Eureka?

Mr. Thornton.—Yes, sir; for the Lookout—three years ago. I just want to fix the body of ore so as to show the places, because these have become obliterated, from the cavings and so forth.

720 Q. Going down from the mouth of the Tip-Top incline on his map, then, you might show us an ore-body extending to point 13, an excavation on that map?

A. 31?

Q. 31, yes; which is exactly half-way between the ends of the side line of the Lookout. Now he has placed that ore-body at that point; at the point marked 5, in pencil, on the map?

Justice Field.—In the Lookout?

Mr. Thornton.—Yes, sir. It is just under the line at that point. Now, that would bring the ore to about that point where letter A is in the word Richmond on the plaintiff's map, marked "Exhibit A." Have you ever been in that ore-body?

A. I think not at that point. That I do not think is exposed. I have never been that far in.

Q. Have you ever come out from the Champion croppings along the Champion tunnel, to the top of the Shaw winze?

A. Yes; I believe so. I didn't know a winze of that name.

Q. Did you find any ore in that tunnel, between the mouth of it and the Shaw winze?

A. I think there is no ore there.

Q. Is there any at the top of the Shaw winze?

A. I believe there is ore at the top of the Shaw winze. I stoped out some distance along down the winze.

Q. So there is an ore-chamber there at the mouth of the Shaw winze, that you recollect?

A. The winze that I remember—I do not remember the name of the winze.

Q. Now, you go down that winze about 100 feet and come around in a drift to the head of the three winzes—top of the three winzes?

A. Yes, sir; something like that.

721 Q. After you get down that winze in ore, do you come along in an ore-chamber or stope in that drift from the bottom of that winze towards the three winzes?

A. Part way towards it; yes, sir.

Q. Up about as far as represented by that green line, is it?

A. It might be.

Q. Well, was there ore all the way to the top of the three winzes in that [showing]?

A. There was reddish ground there.

Q. Ore part of the way and reddish ground the rest of the way?
A. Yes, sir.
Q. Then, was there an ore-body at the top of the winzes?
A. Not much ore at the top of the winzes.
Q. Well, as you went down in that winze, did you find it going through the ore?
A. The winze would go down with the ore in places.
Q. Down to within 35 feet, the testimony is, to the level of the Lizette tunnel?
A. About 35 feet.
Q. Then, after you got down to the level of the Lizette tunnel and entered the Lizette tunnel at that point, do you go 61 feet before you reach ore in the Lizette tunnel?
A. Yes, and more.
Q. How far do you estimate that?
A. I did not see any ore there at all.
Q. You did not find any ore?
A. No, sir.
Q. Do you find any oxides of iron there?
A. A little.
722 Q. After going what distance?
A. About 90 feet.
Q. About 90 feet you place it?
A. I place it at 90 feet.
Q. Now, then, did you ever go around in the other branch of the Champion tunnel—the right-hand branch of it as you enter from the mouth, going to the Shaw winze?
A. No.
Q. You never came round there?
A. Not if I recognized the ground there; no, I did not. I think that is impossible.
Q. Now, then, you recognized the Champion chamber there, as marked out?
A. Yes, sir.
Q. And the other ore-chamber, on the third level, and the Buckeye ore-chamber?
A. Yes, sir.
Q. Now, then, that barren belt of limestone, is how wide would you say at the widest part along the line of the croppings?
A. On the surface, I should think, 500 feet.
Q. Would you call it 500 out from there to there [showing]?
A. No; that is not the surface, as I understand it.
Q. Do you know the extent of that ore-chamber up and down?
A. No; I have never been in that ore-chamber there.
Q. You assert, then, between that ore-body worked out there, and any ore found over in the Champion, or towards the Champion, is a distance of 500 feet?

A. I should think it was 500 feet between any point I know of. I don't know that ground.

723 Q. Well, if there is an ore-body at that point, as Mr. Westcoat made on his former map, taking that as proven, you would then say it is 500 feet from that to any ore?

A. No, not 500 feet from that to any ore.

Q. That is what I have been asking you two or three times. Why can't you state positively what you think the distance is? What do you think the distance is?

A. Well, I should think if that scale is exactly——

Q. I don't want you to tell it exactly, but I don't want you to say 500 feet.

A. I said 500 feet on the surface.

Q. Well, how near would they be together; how large a space would there be of limestone if they had all been projected up to the surface; those ore-bodies? Suppose those ore-bodies were projected up to the surface?

A. 300 feet, perhaps.

Q. And they lead to the surface there?

A. Oh, if they had been, but they were not.

Q. Well, if they were?

A. The distance on the map, I should estimate to be, by my eye, 200 feet between the two points; the horizontal distance where these bodies cross. The horizontal distance between the projection of ore here, near the point marked D—near the "d" in the word Richmond—and the ore here I should guess to be about 200 feet. A horizontal line would be about 200 feet, as shown on that map.

Q. Now, do you recollect where the Iron shaft is on there?

A. I do not, on that map.

Q. Where that is marked Iron shaft, do you recognize that shaft as the Iron shaft?

724 A. Yes, sir.

Q. And do you recognize Mr. Westcoat as having marked that body of ore that you spoke of, there at that winze?

A. Yes, sir.

Q. Now, then, if this body of ore comes to the figure 5, and that is an ore-cropping at the Iron shaft, and that is ore at that point [showing], and that was projected to the surface, how far apart would it be from this ore-body at 5, over to the Iron shaft?

A. Not recognizing that as ore, but from 5 to the Iron shaft, I should think it was about 100 feet, on that map—not having any scale here.

Q. Then about 100 on?

A. About 100 feet; more on, yes.

Q. Now, doesn't that come very near surrounding, on the surface here, this body of barren limestone that you speak of, commencing at the Buckeye, coming on with that ore-body, that ore-chamber, on the 6th, coming on here to these croppings in the Champion,

coming on here to that ore-body at the winze, and coming on there to that, and finding ore at the Iron shaft, and ore at that point, and that ore being continuous in to the Tip-Top incline, and then going on down here, does it not come very near surrounding and going through that barren belt of limestone?

A. I don't see anything at the Iron shaft which does away with the barren zone or rock of limestone.

Q. Further as to that barren zone. Did you testify in your affidavit: "And further, that this deponent carefully examined the 5th, 7th, 8th, and 9th levels of the Eureka mine, with special reference to the occurrence of ore on those levels, and that on the 5th level from a point marked 55 to a point marked 56 on the
725 map filed by defendant and marked Exhibit A, and on the 7th level from point marked 75 to point marked 79 on said map, and on the 8th level from point marked 88 to point marked 87 C on said map, and on the 9th level from point marked Lawton shaft to ground opposite and near to point 95; the drifts of these several levels and the therewith connected cross-cuts are driven partly in limestone and partly in quartzite and partly along the contact of the two formations, and that excepting some very rare and very small bunches or seams, there is no ore or indications of ore to be found in these workings, and that the more notable exceptions, according to this deponent's observations, are at and near point marked 55 on the 5th level, and in the cross-cut on the 9th level from near point marked 99 E (on map before referred to) towards and at and beyond point marked 98, on said map, and that at point marked 99 A, and point marked 99 D, the ground is of reddish color and shows thin seams of orey-looking material, but that in a general and notwithstanding the exceptions of occasional little spots or seams of orey-looking matter, the ground is barren; and further, that the result of assays of samples taken from these workings submitted by complainant practically confirms this statement, since most of the samples assayed are shown there to contain nothing absolutely of value, or only a very small amount of silver, and moreover, that in all the samples taken from the levels referred to, which would show results of assay worthy of notice, the valuable portion consists very largely, in one instance almost entirely, of gold, a combination of
726 the precious metals unlike that which is characteristic of the ordinary ores of the lode or lodes found within the limestone, and consequently indicating some abnormal and exceptional condition."

Q. Did you so testify?

A. I did.

A. I wanted that in the testimony of this case, Mr. Hague. That is the reason why I read it. Now, isn't there a good deal of gold found in the ores of these mines at different places?

A. I beg your pardon.

Q. Isn't there gold found in nearly all the ores of these mines?

A. I believe there is considerable gold.

Q. But you say it is greater in quantity in these samples that you took through that barren belt and had assayed?

A. Yes, sir.

Q. And from the fact that those samples taken through the barren belt assay more in gold you think they are not ore?

A. I don't say that.

Q. Well, what conclusion do you draw from it?

A. I say that they indicate some abnormal and exceptional condition.

Q. Well, what kind of a condition?

A. Something unlike the ordinary occurrence of ore.

Q. Still it is ore?

A. I don't say that that is not ore, but I say that it indicates an abnormal and exceptional condition, unlike the prevailing condition of the ore in places in the ore-bodies.

Q. You have already stated, I believe, in your examination, that you considered these iron stains or orey matter an indication of ore?

A. It may be an indication of ore.

727 Q. Well, do you know whether or not, in the mining upon Ruby Hill, it is followed as an indication of ore? When the miners reach those indications, don't they pursue them to find the ore-body?

A. I think very likely.

Q. Well, on the outside of all ore-bodies, where they lie in the limestone or next to the quartzite, is not there this low-grade orey matter or iron stains on the outside of the ore-body?

A. Often.

Q. Isn't it nearly always the case, Mr. Hague?

A. I don't know anything to the contrary?

Q. Did you go into the west end of the 3d level of the Eureka Consolidated, on your last trip to Eureka?

A. I did not.

Q. When were you last there?

A. At the end of that level?

Q. Yes, sir.

A. It must have been, I think, in the month of March.

Q. Have you got a note or memorandum of what you found in the end of the level?

A. Of the 3d level?

Q. Yes, sir.

A. I think so.

Q. At that time?

A. [Referring to book.] The 3d level is shown on this map from a point 36, in toward the end, passing a point noted 37; from 36 the drift is partly in limestone and partly touching the contact of quartzite and limestone, and the extreme ends, at the time that

I was there, was formed of the contact, not touching the contact; it was in soft limestone.

Q. With iron stains?

728 A. It was spotted, some part of it?

Q. Spotted with iron stains; to indicate if pushed further it would probably lead to a body of ore?

A. As I remember, I have not noted spots of iron stains. There is a great deal of that limestone which is not spotted red, but is a sort of speckled material, hard to describe, without any iron. I have no note of any iron at that end.

Q. Well, have you noted that it is not iron spots?

A. No; but I generally don't note iron that way. I noted iron when I put it down.

Q. Can you tell whether there was in that limestone iron stains or not at the end of the drift at that time?

A. I think not. I will not be positive. There might be some iron there. I have marked it as speckled, spotted, yellowish spots in places.

Q. Now, then, Mr. Hague, in this barren belt, which you have described, there is an immense amount of unexplored ground, isn't there, in limestone?

A. On the upper levels there is.

Q. On the upper levels and also on the lower levels, is there not?

A. Yes.

Q. Now, may there not be found bodies of ore in that limestone?

A. I don't know what is there.

Q. You can't state whether or not there are ore-bodies in there or not?

A. The barren zone I refer to is mainly dependent on what we have seen, not on what we have not seen.

Q. Now, when you were in this mine you never saw the ore-body at the end of the fifth level?

A. I have described that and saw a part of it.

729 Q. At the time you last went there?

A. No; at my last visit but one.

Q. Well, when you made your first affidavits, or your affidavits in the case, had you seen that?

A. No.

Q. Didn't you believe then that where that ore-body now is was a part of the solid belt of limestone?

A. I am not prepared to say whether I believed that.

Q. Why didn't you? Nobody had known of the ore being there; it had not been discovered.

A. Well, I had no reason to know that there might not be ore between here [showing] and the quartzite on the part of the Richmond ground.

Q. Well, you don't know whether there was or not; it is not connected with the Richmond in any way, is it?

A. I can't say; very likely.

Q. Have you been through these tracings from the fourth level up to that body?

A. No. From the fourth level up to that body? No.

Q. Can you state whether that body of ore is connected with any of these bodies of ore of the Richmond pipe, as you call it?

A. Not positively. There have been no developments.

Q. Well, didn't you, when you stated that there was a great belt of barren limestone between this Richmond pipe and the Eureka pipe, in your former testimony, mean to include all that unexplored limestone that lies through there?

A. I think if you will read my former testimony you will
730 see the points that I described exactly as barren. If I recollect, you are reading just now, you described it between certain points; none of those points include that ground.

Q. Well, you didn't know whether that ore-body was there or not then?

A. Of course, I didn't know whether it was there or not then.

Q. You meant in your affidavit, then, simply to testify that those workings between those points disclosed barren ground?

A. Just so.

Q. And not the surrounding rock at all?

A. The points I described as barren are defined on the map; that is all I described.

Q. So far as the drifts cut and exposed them?

A. Just as described in that affidavit.

Q. Mr. Hague, did you testify as follows in your first affidavit in the equity case? "That according to good geological authority they are of of silurian or devonian age"—that is, these different strata of rock, the quartzite, limestone, shale, and so forth; "that they 'were originally laid down horizontally, but were subsequently up-'lifted to their present inclined position, and that under the influ-'ence of heat, pressure, and chemical action, they have been meta-'morphosed or changed from their original to their present condi-'tion; that the process of uplifting, with accompanying compres-'sion, hoisting, and folding, was the main cause of the formation 'of fissures in the belts of rock, and particularly in the belt of lime-'stone herein referred to, and that the subsequent introduction of 'the ore-bearing material into one or more of these fissures, with
'the accompanying branches, spurs, and enlarged cavities or
731 'chambers, has finally resulted in the formation of the vein
'or lode upon which the Richmond mine has been and is 'now being worked."

A. Yes, sir.

Mr. Wilson.—The proposition of law, I think, is well understood; that is, where a witness is called upon to answer, in regard to his former statements which are in writing, strictly and technically the

whole writing should be submitted to him, and upon his examination, if he says it is his writing, then the whole of it must go in. Detached portions cannot be selected by counsel and read and put in evidence without the whole of it.

Justice Field.—On both sides that course has been pursued, and there has been a great deal of testimony taken that way on both sides. You ask the witness if that is his affidavit, and if he says so, you read such portions as you wish in evidence. I don't know that that course was pursued on the other side.

Mr. Thornton.—These are separate and isolated facts as to this formation. There is a whole mass of matter here which is given in the affidavit; but he has as to these matters stated certain facts upon which we wish to rely. I could read that to him and ask him whether he so testified almost as well as to have crystallized and compressed his statement into my own language, and then ask him the general question. It just brings before the court at this trial those portions of the affidavit which we desire to have produced; and if he says they are connected with other matters so that they need further explanation, why, then, we would consent to the explanation being made.

Justice Field.—If you read certain portions of the affidavit, the other side are at liberty to read the balance.

732 Mr. Wilson.—We do not wish by any such examination to have our rights waived on our side of the case. We did not suppose there was any compact on the subject at all. We don't want to violate any agreement.

Mr. Thornton.—There is no agreement.

Mr. Wilson.—They have gone into the subject.

Justice Field.—They ask the witness if that is his affidavit; they read such portion as they chose, and you can read the balance.

Mr. Thornton.—We did not want to put it in as our part of the case.

Mr. Wilson.—We consider, then, the whole affidavit in as offered by us when you read a portion. That is the ruling of the court.

Mr. Justice Field.—Whatever relates to that particular point referred to.

Mr. Thornton.—There is page after page which has no bearing upon this question of the fissuring and forcing.

Justice Field.—Whatever relates to that that you read.

Mr. Wilson.—We think the whole of it does.

Justice Field.—Then put it all in evidence. I don't think there will be any great difference made in regard to that.

Mr. Thornton.—Q. "And deponent further says that the belt of 'quartzite which underlies the belt of limestone enclosing said lode 'can be traced on the surface in the neighborhood of the said mines 'and beyond them for a distance of several thousand feet, probably 'more than a mile, and can be seen at many points in the under-

'ground workings of the K. K., Eureka, and Richmond mines; that
'owing to the uplifting, compression, and folding of the said
733 'beds of the ore-belts, the line of contact of the two forma-
'tions of quartzite and limestone is exceedingly irregular in
'its course, varying from north and south to east and west, and that
'its dip is likewise exceedingly irregular, being at many and various
'degrees of inclination to the horizon, and that said surface of con-
'tact sometimes forms large wave-like elevations and sometimes
'large trough-like depressions, the said surface dipping at different
'points in opposite directions and at greatly varying angles to the
'horizon." And speaking of this limestone further, "That its com-
'position and texture vary exceedingly, being sometimes siliceous,
'sometimes ferruginous, sometimes hard, and oft compact, granular,
'crystalline, broken in large blocks, finely brecciated, friable, and
'sometimes, though rarely, distinctly stratified, and that within said
'belt of limestone are abundant evidences of fissuring produced by
'some deep-seated course; showing remarkably well-defined lines
'or planes of fracture, with permanent strike and dip, and traceable
'for hundreds of feet, both in length and depth, and showing the
'marks of striatiation usually found upon fissure-walls of walls." Is that a part of your affidavit, too?

A. Yes, sir.

Mr. Wilson.—What affidavit is that?

Mr. Thornton.—This is his first affidavit.

Mr. Wison.—What is the date?

Mr. Thornton.—That is the affidavit of 12th of April, 1877.

Q. Now, then, as to the belt of limestone between the shale and the quartzite: "And deponent further says that the same belt of
'limestone enclosing said lode [meaning the Richmond lode]
734 'can be traced on the surface for an indefinite distance; that
'it is of variable thickness between the underlying quartzite
'and the overlying calcarious shale, as shown in the workings of
'the Eureka and Richmond mines, being more than one thousand
'feet thick, measured horizontally across the surface in some places,
'while underground it varies very much, being 206 feet from the
'said quartzite to the said shale in the 10th level of the Eureka, and
'about 240 feet in the 6th, between 250 and 300 feet in the 7th, and
'more than 300 feet in the 8th levels of the Richmond." Is that your description of the limestone belt?

A. Yes, sir.

Q. Between that and the shale? "And concerning," further——

A. That is another affidavit, isn't it?

Q. Yes; this is the affidavit No. 2, of the 22d of May, 1877. Did you use the following language? "And concerning the alleged qual-
'ities of the limestone in the belt aforesaid this deponent says, that
'in his opinion there is as much difference in texture and composi-
'tion to be found between the several varieties of limestone, all

'occurring between the quartzite and the shale, as there is between 'the limestone belt aforesaid and that of other neighboring belts 'beyond the quartzite or the shale, referred to by complainant (see 'Lockhardt); and that moreover what difference may exist between 'the limestone within and that without the said belt does not in any 'way affect the question at issue, since such difference, whatever it 'may be, would be in no way inconsistent with the theory of the 'formation of the vein, as held by the defendant, and could be as 'readily due to the conditions producing the vein, according
735 'to the view of the defendant, as it could be to the condi-'tions claimed by complainant, as the cause of his so-called 'lode."

A. Yes, sir.

Q. Did you mean by that to say that there was or was not a difference between the limestone, between the shale and the quartzite, and that outside of the shale?

A. I mean to say that there are many varieties of limestone, both inside and outside.

Q. And that you could see no difference?

A. And that I can find as great a difference between that on the inside and that on the outside, or rather, to put it the other way, I can find as great difference between two pieces from the inside as I would between pieces from the inside and outside.

Q. Then you went on to say that if there might be a difference—if there was a difference—that it would not change or have any effect upon your theory or upon our theory of the foundation of the ore-beds?

A. Not so far as I can understand.

Q. So, then, in your opinion, whether the limestone was the same or not, inside or out, it does not affect either the theory of the plaintiff or the theory of the defendant?

A. Once more, I don't understand the bearing of that thing.

Q. Do I understand you to say, that whether the limestone in and out is the same or not, makes no difference as to either the theory of the the plaintiff or the theory of the defendant?

A. I don't think I say that exactly.

736 SEVENTH DAY—CONTINUED.

Cross-examination of J. D. HAGUE—Continued.

Q. Well, what do you say?

A. I say that, whatever differences there may be in the inside limestone, does not affect the question at issue, in my opinion; because, it seems to me that those differences may be due to the conditions under which the Richmond lode was formed; as well as to the other.

Q. Well, do you wish to make any other explanation of that sentence?

A. No.

Q. That is all, then, on that point? Does this sentence occur in your affidavit? This is the first affidavit:—"And deponent further 'says, that after having examined the said Richmond mine, and 'carefully studied the mode of formation of the lode on which the 'said mine is worked, he is of opinion that the said lode owes its 'origin to a fissure, or system of fissures in the limestone; that said 'fissure was irregular in form as fissures in limestone generally are; 'that by lateral movement of the ground the opposite sides of the 'fissure were moved with relation to each other, thus, owing to the 'irregular form or outline of the fissure, bringing the sides or walls 'into close contact with each other at some points and causing wide 'expansions of the fissure at other points; that the same movement of 'the ground, or similar movements in the direction of the dip would 'result in the alternating arrangement of the steep depth
737 'with the side of the fissure in close contact in some places, 'level or gently inclined floors with expansions or chambers 'above them in other places; that the subsequent penetrations or 'introduction of the ore-bearing solutions or vapors into the fissure 'would result in the large deposition of ore in the expansions or 'chambers where the passage was free, and in the very limited 'deposition of the same where the passage was choked by the con-'tact of the walls," etc.

A. I wrote that.

Q. Is that the language you used?

A. Yes, sir.

Q. Now, does that language describe a pipe-vein?

A. Yes; a pipe-vein may be formed. I don't give that as a full description of a pipe-vein, but a pipe-vein may be formed under just those conditions.

Q. It might be?

A. And has been, I think; that is my opinion.

Q. In this case?

A. Yes.

Q. Do you know of any other formed under such conditions, any other pipe-vein formed under such conditions?

A. From what I know of pipe-veins, I should think that they might have been formed under similar conditions.

Q. Well, do you know whether any had been formed under similar conditions there—a parallel case of a pipe-vein formed under such conditions?

A. I cannot pronounce on any pipe-vein, how it may be formed, or whether it agrees with these contingents exactly, without the opportunity of examining it.

Q. Did you ever see any other pipe-vein but this?

A. No, I think not.

738 Q. Did you ever read of any pipe-veins?
A. Yes.
Q. Where, and what authors?
A. I have read in various authors.
Q. Well, name the author.
A. I have read in J. D. Whitney.
Q. His "Metallic Wealth of the United States?"
A. "Metallic Wealth."
Q. Well, who else?
A. Von Cotta's Ore Treatise.
Q. Is it Prime's translation you refer to?
A. Yes; Prime's translation.
Q. Now name any other book.
A. I have referred to pipe-veins in various other books.
Q. Well, name a book.
A. Well, Jukes for one.
Q. This book that is upon the table here?
A. Like enough.
Q. Well, in any other book?
A. I think in De la Bache's Geological Observer. I have seen references to it.
Q. That is a book that has been presented here, has it?
A. I believe it has.
Q. Well, name another.
A. Well, I do not remember any other at this moment.
Q. Do those books, or any of them, describe such a body of ore as this, as a pipe-vein?
A. I think they do.
Q. Which one?
A. I think Von Cotta does.
Q. You think Von Cotta does in his descriptions. Do the rest?
739 A. In a general way. I do not mean to say that the details of their descriptions would agree exactly with these, but the general idea of the formation of a pipe-vein as described by any of those authors would be well illustrated by this vein.
Q. Well, will you find by to-morrow morning and hand me the passages from those books which so describe a pipe-vein?
A. I will try to.
Q. Now, you say that this Richmond is upon a fissure or system of fissures?
A. Yes.
Q. Is it upon one continuous fissure or upon several fissures?
A. I think there are several fissures, or at least more than one.
Q. That is what you mean by system of fissures?
A. Yes, sir.
Q. How many fissures, then, do you mean to describe when you speak of the system of fissures upon which that lode is?

A. Well, I do not think it is one simple fissure. I think there are a number of fissures, as illustrated, for instance, between the 2d and the 4th levels, where there is a back fissure and a front fissure that join each other. Then again the fissure that comes down from the 200-foot level might be termed, as we know it goes down to the 400-foot level, that might be described as one fissure, whereas the continuation of that fissure which is at the northeast end of the long flat that goes out from the bottom of that fissure might be called another; I should call it one. I consider the dip of that fissure as represented by a series of steep dips, then flats, then a flat
740 with ore on it, and another steep dip and another flat, and so on; and you may, as you please, call those succeeding fissures, one after the other, different fissures, or one fissure. I regard them as one fissure.

Q. They are not continuous, though?

A. Not in a vertical line, or not in a line over each other, which would be indicated by the dip; but it is more in step-fashion.

Q. Well, from the top down, how many fissures did you find from the surface down to the lowest workings of the Richmond?

A. Well, from the surface down the fissures cannot well be traced now, because the ground has caved, and it is inaccessible. Still I could see traces of the fissure-lines up there. When you get down to the 200-foot level, or leaving the bottom of the flat chamber you come down on that winze which you see there in the section [refering to model] on ore, and come to the 200-foot level. There is a plainly marked fissure, which is open for a length of perhaps 100 feet, not quite so much traceable in the level, and can be followed down to the 4th level; there is another flat; there comes in another ore-body, and at the northeast side of that again on the 5th level we see traces of the same fissure, and on the 6th level at the southwest side of the ore-body there is a fissure traceable throughout the length of the mine, from point to point, not always continuous, and below that, between the 6th and 7th, you see traces of the same line of fissure, as I hold it to be, and below that on the 7th we come to a plainly marked fissure-line, which is descending from there to the 8th, and can be followed down from one to the other and below the 8th, in a winze 50 or 60 feet. I call that one fissure, al-
741 though they occur in breaks, steps; others might say there were two fissures or three fissures. That is why I say a system of fissures.

Q. Now, do you find any fissures in that course which run at a different strike from these fissures which you have described?

A. At a different strike?

Q. Yes.

A. Some subordinate fissures and small seams; nothing comparable with these, however.

Q. Not as large?

A. No.

Q. Is there a drift on the 8th level which opens a fissure about 60 feet in length, almost at right angles to this fissure which you have described?

A. No.

Q. Have you observed a fissure?

A. Yes; I have observed that drift. I have not observed any fissure.

Q. Didn't you observe a fissure-seam in it?

A. No. Where do you mean, sir?

Q. Any drift from the 8th level. I have forgotten exactly where.

A. Oh, yes; there is a fissure; there is a continuation of this ore on the 8th level. I will show it to you. There it is on the 7th; this here [showing on defendant's model].

Q. Now, where is it on the 8th level?

A. [Pointing]—There it is, very plainly marked.

Q. At that point [showing]?

A. Yes, sir.

Q. And it is the same fissure you think?

A. It is the same. It can be traced down in a winze.

742 Q. Is there a winze down, tracing it from one of those drifts to the other, or where is the winze that goes down?

A. This winze that goes down in ore—one-half this ore-body goes down about 20 feet in ore-stopes, and when you get down there you have this seam of ore showing very plainly, and the line of fissure traceable down on the ladders—down to that 8th level; you trace it, when you get to the bottom of the ladder you are here, and you have to look through a point of rocks. Here you see the fissure on one side very plainly marked "D," with an enclosure of several inches of ore. You pass around that point along the 8th level and you see it coming out here very plainly, and you follow it along in that way [showing].

Q. How far?

A. If I remember it is about 30 feet.

Q. Now, is there any fissure observable near that, anywhere in the main drift, of a different course from this one, which you have described in the 8th level?

A. Near that?

Q. Yes.

A. Only the continuation of it on this side [showing]—follow it out here [showing.]

Q. On the opposite side of the level?

A. On the opposite side of the level. It goes that way about 30 feet.

Q. Is there no other fissure found along the 8th level anywhere, except that one that comes there?

A. I do not remember any.

Q. Mr. Hague, isn't it shown? Isn't any fissure-plane shown in the drift itself?

A. Which drift, sir?

Q. In the 8th-level drift, after you get into the vein matter, from the shaft.

A. From that shaft, there out here [showing]?

743 Q. Yes, sir.

A. I do not know any.

Q. Don't remember it. Well, is there any along the 7th level of a different course from that one which you have described as running out in that drift from 7 to 2, running to the northwest?

A. I do not remember any. I will refer to my notes once more. [After referring to notes.] No, sir. I do not know of any.

Q. Up in the Lizette tunnel, and in the level of the Lizette tunnel, did you not find a great many fissure-faces and planes of smaller size, breaking in every direction?

A. In the Lizette tunnel? No.

Q. You did not?

A. No. There may have been some small seams there, but nothing notable as lines of fissure.

Q. Well, did you notice any short faces of fissure up there—one foot, two feet, three, four, or five, in length?

A. Nothing particularly notable on that level.

Q. You did not along that level, notice a great number of smaller fissure-planes and faces?

A. No; not notably so.

Q. Not at any point?

A. No.

Q. Not notably so. Do you mean not more so than throughout the entire limestone belt?

A. I noted nothing of that sort. Nothing attracted my attention particularly as showing a line of fissure, or of fissure-planes.

Q. Well, through the entire limestone belt, did you find a great many fissure-planes of small size?

A. A good many small joints and seams frequently.

Q. Very frequently throughout the limestone?

744 A. Well, sometimes; it depends, sometimes limestone is very hard and compact and it presents all manner of varieties, especially in the neighborhood of the ore-bodies, and the limestone is sometimes jointed but nothing comparable to these fissure-planes that I speak of in the Richmond; as different from those as the fissure in granite would be from the small joints that are in the rock that has been fissured.

Q. Is there any fissure found by you within that limestone which extends through the shale or into the quartzite—through into the shale or through into the quartzite?

A. I do not know of any going into the shale, nor do I know of any that I have seen that has the appearance of going into the shale. There are fissures that, for aught I know, may enter the quartzite.

Q. But none that you know of entering the quartzite?

A. Well, none on which the evidence is positive; but there are some which very likely might enter the quartzite.

Q. Which very likely might enter the quartzite?

A. Well, I cannot say; seeing something like a fissure in the quartzite at one point, and then at a considerably remote point seeing a fissure in the limestone, I am not prepared to say those are the same fissures, but they may be.

Q. Well, you cannot say, then? I understand you to be unable to state there is any fissure which you yourself have seen cut through the limestone into the quartzite?

A. None that I know positively as having entered the quartzite.

Q. Do any fissure-planes of this pipe-vein of the Richmond extend to the quartzite?

A. I think they do.

745 Q. Do they extend into the quartzite?

A. Well, they may. I just told you I cannot tell whether they go in there or not.

Q. Well, they extend to the quartzite?

A. I think so.

Q. State where they extend to the quartzite.

A. Well, I think very likely they extend here on the 3d and 4th levels. I think very likely that body of ore [showing] on the 9th level, now being worked by the Eureka [referring to the defendant's model].

Mr. Thornton—Q. On the Eureka 9th level?

A. Yes, sir. I think very likely that is due to the continuation of some fissure from the Richmond coming in there, touching upon the quartzite and making that deposit of ore there.

Q. It is your opinion, then, the 9th level ore-body of the Eureka Consolidated is a part of the same ore-body that is worked out in the Potts chamber?

A. It think very likely that it is a spur of the Richmond lode; that is my opinion.

Q. Likely it is a spur of the Richmond lode?

A. Yes.

Q. Well, do you believe there is an ore connection between that 9th level ore-body of the Eureka Consolidated and the Potts chamber ore-body?

A. I think it is very likely, although I have not traced it.

Q. You have not traced it?

A. No.

Q. But you think likely it is the same?

A. I think likely it may be found by and by, when they get new drifts opened through.

Q. It is your opinion now it is the same?

A. I think very likely it is a spur of the Richmond lode.

746 Q. What do you think about the 5th level ore-body?

A. I should not wonder if that was the same.

Q. As a spur?

A. A spur of the Richmond lode; developments don't show it, but it would not surprise me if it should turn out that way.

Q. Now, you speak of a cape of quartzite coming out here and dividing the Richmond pipe from the Eureka pipe. Is there not one cape of quartzite protruding out into this body of limestone, and found on the 9th level of the Eureka Consolidated?

A. Yes, sir; as you have just indicated there with your pencil [on the defendant's model].

Q. Yes, sir?

A. Yes, sir.

Q. Is there not also another cape of quartzite between that cape and the Richmond pipe-vein of which you speak, which is the cape which has a southwesterly or a westerly dip in the workings at the west end of the 5th level of the Eureka Consolidated?

A. There is a curve there. I do not see anything that is comparable to this one.

Q. Well, isn't there a curve almost at right angles here at one point?

A. Whereabouts?

Q. On Mr. Westcoat's map it is exposed. I do not see it here.

Mr. Wren.—That is an exact copy; there is not a particle of difference.

Mr. Thornton.—Yes; I see it, near the cave on the 5th level.

A. Yes, sir.

747 Q. Do you see the quartzite brought up in the corner there, where the black line is running back again?

A. Oh, yes.

Q. Now, doesn't the quartzite come up in this way in a cape and then break right back?

A. Well, I said I should take the main cape to be here, curving and recurving in there [showing].

Q. That you take to be the main cape?

A. I do; yes.

Q. And this [showing] a subordinate cape?

A. Yes, sir.

Q. But still it is a protrusion forward into the limestone?

A. It is an irregular curve on a horizontal line there.

Q. In going down from that 5th level ore-body to the 9th level ore-body, you say you did not go through the late workings to which Mr. Westcoat testified this morning?

A. No, sir.

Q. You heard him under my examination?

A. I did.

Q. Commencing at the 5th level ore-body, and tracing the ore almost continuously into the 4th level of the Richmond?

A. Into what level?

Q. 4th level of the Richmond.

A. Yes. I heard what he said.

Q. Well, isn't that your recollection of it; that he traced ore almost continuously, in a series of winzes and works, down through which you had not passed, to the 4th level of the Richmond?

A. I do not remember exactly what he said. I could not see the map where I was, clearly. I don't know exactly how far it went.

748 Q. Well, you recollect he described workings which you have not been down?

A. Oh, yes; certainly.

Q. In speaking of the line of contact between the interior limestone and the quartzite you say that frequently you found manganese on the line of contact?

A. I found a black material which is likely called manganese. I think very likely it is, but I never proved it.

Q. Well, if it is manganese, how did it get there?

A. That is what I don't know. I suppose it got there like the rest of the stuff.

Q. Did you find it anywhere else in these workings, except on that line of contact?

A. No. I don't remember it anywhere, except mainly on the contact; generally a small seam of this black material that lies upon the contact.

Q. Do you remember in the Richmond workings a bulkhead holding back the water?

A. In the Richmond?

Q. In the Richmond workings at any point?

A. I believe there was one put in on the 6th level.

Q. Well, do you know the point where it is?

A. Pretty nearly.

Q. How far is it from the shale?

A. Not far, I should say. I do not know exactly, but I would guess that it was anywhere from 25 to 50 feet.

Q. The two bulkheads in the Eureka Consolidated, one of which holds back the water entirely, and another which lets the stream come out which runs through the level, both dam the water back towards the shale, do they not?

749 A. I only remember one bulkhead in the Eureka; that is in a cross-cut in the 9th level.

Q. Where the stream of water comes out?

A. No. Well, it may leak some; but the stream of water I refer to in my direct examination was where there was no bulkhead at all; that is in the long cross-cut that develops that cape of quartzite. There is a large stream of water coming out there.

Q. Well, that cross-cut runs up to the shale; doesn't it?

A. No; not if I remember; the cross-cut you are speaking of.

Q. It runs through the quartzite, then?

A. In the limestone, and some distance in the limestone, as shown there, 150 to 200 feet.

Q. You never went in beyond the bulkhead?

A. The place I am speaking of, Mr. Thornton, there is no bulkhead. I am speaking of this cross-cut here [showing], coming from the 9th level through this cape of quartzite, and not this point here [showing]. There is no bulkhead and a large stream of water coming out there.

Q. Did you see where that water came from?

A. It came out of the limestone.

Q. Didn't it come down a drift that connected with that drift which you have pointed out upon the model?

A. Down a drift?

Q. Yes.

A. No. It came out of a hole in the drift; came pouring out into the end of the drift.

Q. And you saw it pouring right out down from the limestone?

A. Yes, sir.

Q. Down into the drift?

750 A. Falling into the drift.

Q. What is the definition of a pipe-vein, Mr. Hague?

A. A pipe-vein, as I understand it, is an irregular enlargement or chamber—cavern filled with ore and descending into the earth generally at an angle, and called pipe-vein on account of its form resembling pipes.

Q. Would each separate ore-body be a separate pipe-vein, or does the whole make one big pipe-vein?

A. Well, if it were continuous it might make one; if there were several there would be lots of them.

Q. Lots of pipe-veins?

A. Certainly.

Q. Now, in the Richmond, are these different bodies of ore on these different fissure-planes? Are they separate pipes, or were they parts of one pipe?

A. I think they are one pipe; I should so describe them. The body of ore occupies an enlarged chamber, which corresponds to the definition, along this line of fissure, and these continue from the surface; it is continuous from the surface to the bottom. It is not uniform in diameter or in section from the top to the bottom, and they may be considered one body or a connected system of bodies. If it were not objectionable to introduce new names, I would call it a sausage-vein, because it is like a string of sausages—a linked series of expansions and contractions of one continuous casing; that is, a string of sausages, virtually; and here you have a body of ore, large, and then you come to a stricture, and then you come to another large body, and then another.

Q. Don't the books which you have named describe each enlargement as a separate pipe-vein?

751 A. Well, I don't know that they enter into that detail. I don't remember that they describe every chamber as a separate pipe. They may, or they may not. The name is a mere name for convenience, to describe the form of a vein.

Q. Well, are pipe-veins true fissure-veins, or true veins?

A. Well, that is a question that people discuss. I should call this a fissure-lode with a pipe-like development along its line. Those fissure-planes are lines of fissure to which the lode owes its formation. It is a fissure-lode. We can trace that fissure without any ore it, or anything to speak of, along those lines of fissure where the walls are close together, and there they expand into these large chambers which take the form of pipes.

Q. Well, if there is a true fissure-vein or fissure-lode as you have described, why do you apply to it this term of pipe-vein?

A. Because it is a pipe-like vein along the line of fissure. It is called a fissure-lode. It is not a typical fissure-vein, like those described in the books as typical fissures, but it is a fissure-lode because there is a fissure there to which is owed the formation of the vein, and along that line of fissure occur these large chambers which have been found and enlarged partly as already described in my affidavit that you read, by the movement of the walls bringing the projecting points of the wall close to each other and the receding parts opposite each other, and so producing a cave. Those cause cavities and chambers, being again enlarged by the introduction of material, the very process of which would dissolve away the limestone and make irregular spaces of all manner of form, de-

752 positing the ore in them so that we have a line of fissure which can be traced for hundreds of feet, and of which the northwest end is still undetermined in the Richmond, and along that line of fissure we have this pipe, and we may have other pipes.

Q. Also?

A. Perhaps.

Q. Well, you say this is not a typical fissure-vein?

A. No, sir.

Q. Is it a typical pipe-vein?

A. I think that part of it, that ore-body, is a typical pipe.

Q. You think the ore-body is?

A. I think the ore-body, out of which most of that ore has come, is a typical pipe.

Q. A typical pipe-vein?

A. That part of it.

Q. Is there any difference between a pipe and a pipe-vein?

A. I don't know that there is any difference between a pipe and a pipe-vein. I don't know whether you mean a tobacco-pipe or not.

Q. Well, a pipe of ore or a pipe-vein.

A. No; I should say a pipe-vein and a pipe of ore were intended to be the same thing.

Q. Then a pipe of ore within a vein is a pipe-vein, is it?

A. A pipe of ore within a vein?
Q. Within a vein.
A. Is a pipe-vein within a fissure-vein, a pipe of ore?
Q. Within a fissure-vein is a pipe-vein, is it?
A. Yes, sir.
Q. Are pipe-veins included by any author as a part of the general classification of veins?
753 A. Well, they are referred to by most authors as one variety of vein.
Q. What, as one general classification, or as a local and subordinate name in use among miners of certain localities?
A. Well, its use is being extended as we find more pipe-veins.
Q. Mr. Hague, if this 5th level ore-body of the Eureka Consolidated can be traced, assuming that it can be traced, down to the 9th level ore-body, what would you call that; a pipe-vein?
A. If that can be traced?
Q. Suppose it is a continuous ore-body from the 5th level to the 9th level of the Eureka Consolidated, would you call it a pipe-vein?
A. That would depend. I should have to see it first.
Q. It would depend on its shape, would it?
A. Somewhat, certainly. I should not call it a pipe unless it had something of that form which would warrant the use of that term.
Q. Now, if it rests all that way upon the quartzite, and the limestone is overhanging it, wouldn't you call it a contact-vein of ore?
A. I call those contact-deposits where they rest that way.
Q. You do so call them?
A. Certainly.
Q. You would call that then a contact-deposit?
A. I should call it a contact-deposit at that point.
Q. What is the difference between a contact-deposit and a contact-vein, in your opinion?
754 A. Well, there might be some difference in it. It would be contact-vein so far as it extended; for that distance you might call it a contact-vein, if you please, just as that distance on the Comstock, you might call that a contact-vein there, as far as the vein enters the contact. As for this pipe, I simply call that a vein or pipe of ore on a fissure-lode, and that fissure-lode may have varieties of forms occuring upon it, either pipes or contact-deposits, or according to circumstances; according to what you find.
Q. You would not call the whole vein a pipe-vein, but you call the separate bodies of ore pipes of ore, do you?
A. That would be my idea, if it was simply to convey the idea of what the ore-body was. I use the term fissure-lode because I think it is a lode along the line of fissure, and along that line have occurred bodies of ore, and this one, notably, has the form of a pipe; consequently, I think it would convey a proper idea of its form to anybody who has read those descriptions of pipe-veins by calling it a pipe; that is all.

Q. What acid did you use in testing the limestone and quartzite through there?

A. Hydrochlorate.

Q. Can you tell by acid always the difference between magnesian limestone or dolomite and common limestone?

A. No. I don't use acid to determine dolomite.

[Here the court adjourned until to-morrow morning at half-past ten o'clock.]

755 EIGHTH DAY.

WEDNESDAY, *August* 1, 1877.

J. D. HAGUE recalled for further cross-examination.

Mr. Thornton.—Q. Mr. Hague, just give me the citation of the pages and passages which define a pipe-vein?

A. [Producing books.] Prime's Translation of Von Cotta's Treatise on Ore Deposits.

Q. What page?

A. On pages 431, 435, 436. Whitney's "Metallic Wealth of the United States," some description of such veins on papes 361, 362.

Q. Is a part of that description the sentence I read to Professor Whitney while he was being examined—the last sentence of it?

A. I think so; but I am not sure. I don't remember the citation of the page, but I think that must be the same.

Q. Well, that is the same.

A. "Students' Manual of Geology, Jukes," page 297, and a reference to what is called *carbonas*, analogous to pipe-veins, on page 303. W. J. Henwood on "Metalliferous Deposits and Subterranean Temperature," part first, forming the eighth volume of the "Transactions of the Royal Geological Society of Cornwall," pages 620 and 621. Those are all that I brought with me, being all that I had at hand this morning.

Q. Mr. Hague, is the description of pipe-veins in Jukes given as his own description, or is it copied from some other author?

A. I think it is quoted.

756 Q. Whom is it quoted from?

A. His description of a pipe-vein on page 297 is quoted from West Garth Foster.

Q. Do you know who West Garth Foster was?

A. I do not.

Q. Never heard of him in his profession before?

A. I have heard his name before, but I do not know anything about him.

Q. Do you know anything about his standing in his profession, then?

A. No; nothing more than I have seen him quoted more than once.

Q. You do not know whether he was a mining engineer or a geologist?

A. No, I do not. I suppose Mr. Jukes knew that.

Q. Who is Jukes?

A. Jukes was a geologist.

Q. Did you ever see any other copy of his book than that [indicating a book near witness]?

A. Yes.

Q. Of the same book?

A. The same book, I believe.

Q. Do you know anything about Mr. Jukes as a geologist, or his standing?

A I believe he was a man of eminent position; often heard him referred to, and seen him quoted in other works; that is all I know of him.

Q. You do not know anything of his standing yourself?

A. No; I don't know more than that.

Mr. Thornton.—Now, if the court please, to draw his attention to one or two analogies with the Comstock, on a point somewhat germane to the one suggested by Judge Sawyer yesterday,
757 I would like to ask the witness briefly one or two questions on the Comstock.

Q. Is the clay hanging or east wall of the Comstock a continuous single layer or vein of clay?

A. I think not. Not that I know of.

Q. Is there porphyry in the Comstock vein, besides the ore and quartz?

A. Is there porphyry in the vein, besides the ore and quartz?

Q. Yes.

A. I understand that there is.

Q. Haven't you seen it there?

A. Yes, sir.

Q. Where did it come from?

A. From the country rock.

Q. Well, is it your idea that it fell down from the country rock into the vein, or was there a crack around behind it in the country rock when the fissure was made?

A. Probably both; that is to say, both sorts; a great many fragments that have fallen, and also slices of country rock that lie between fissures.

Q. Can you give the dimensions of the largest body of porphyry which is found in that vein in the lode?

A. No, I cannot, except that it is very large.

Q. Haven't you often read a book containing a measurement or description of it.

A. I do not remember the figures.

Q. Well, what is your recollection of the size of it, Mr. Hague? Didn't you help write the book upon the subject?

A. Not upon that subject. I helped write the book which contains that chapter.

Q. Do you remember the dimensions of that body of porphyry?

758 A. No; I do not.

Q. Is it 2,500 feet long and 400 feet thick?

A. I don't remember, but it is large.

Q. Well, did that large body of porphyry fall into the vein, or did a crack or fissure, at the same time that the vein was formed, run around in the country rock and embrace it?

A. Well, I can't say from personal observation.

Q. What is your idea or opinion about it?

A. Well, I never examined it with reference to that subject.

Q. Is there any difference between that body of porphyry in the Comstock and the porphyry of the country rock on the outside of the vein?

A. Well, there may be some difference; I don't know. Frequently, though, those horses and fragments are altered and changed in their condition by being in the vein. As to this large one you speak of, I am unable to say.

Q. I do not confine it to that. How does the porphyry in the inside of the fissure or vein compare with that on the outside?

A. Well, small fragments, I think, are altered a good deal.

Q. And the large bodies not altered in their interior spaces, you suppose?

A. Well, I can't say of my own knowledge, because I never studied that horse at all, that fragment at all.

Q. Never went into it to examine it?

A. Not to examine into it closely, with reference to such fragments as those.

Q. I will not confine you to that horse alone. Is there any porphyry in the vein that is like the porphyry on the outside?

A. Well, I can't tell you.

759 Q. Isn't the only difference—now, I will state it to you—can't you recollect that it was more crushed, and to some little extent, perhaps, mineralized?

A. You are speaking now of the porphyry?

Q. Yes, sir; the porphyry in the veins from that outside of it.

A. Much of it is. Yes; I say many fragments are changed considerably.

Q. Mr. Hague, are the ore-bodies or the systems of ore-bodies in the Comstock found in the shape of chimneys?

A. They might be so described; yes.

Q. With great distances between these separate systems of chimneys—ore-chimneys?

A. Often.

Q. Now, why might not those chimneys in the Comstock be called pipe-veins, according to your definition and idea of it?

A. Well, first, they have not the form of pipes. "Pipe," I understand to be a name applied to describe the form.

Q. And nothing else?

A. Mainly the form.

Q. Then the difference between a pipe and a chimney, in your opinion, is simply owing to the form?

A. That is what the name comes from.

Q. Now, at the Gould & Curry was there not a chimney or body of ore dipping down into the Savage and on into the Hale & Norcross, and in the lode at each side of it separated by large barren masses from the other ore-chimneys?

A. Separated from what?

Q. From the other ore-chimneys in the lode by a long barren space?

A. I think so.

760 Q. Now, why would you not call that a pipe-vein?

A. It has not the form of a pipe.

Q. Well, what is the form of that body of ore or chimney of ore?

A. It is an irregular body, perhaps more lenticular in shape than anything else.

Q. What is that?

A. A body of irregular form.

Q. Well, it is extending down a great depth into the ground, isn't it?

A. Yes.

Q. And it is chimney-shaped, you say?

A. It is called a chimney.

Q. And you would not call it a pipe simply because it was not of the shape of a pipe, but call it a chimney because it is the shape of a chimney?

A. Well, it is so called; yes.

Q. That is your science of the subject, is it?

A. It is called a chimney, locally.

Q. Now, if it had been the shape of a pipe as it extends down into the ground there, you would call it a pipe in the Comstock, would you?

A. I might call it a pipe if it looked like a pipe.

Q. You would call it a pipe if it appeared to be of the shape of a pipe instead of the shape of a chimney? You would call it a pipe?

A. It might be called a pipe if it looked like a pipe.

Q. Do you remember a barren space in the Comstock, at the Bullion, of 1,200 feet in length, separating two of these chimneys of ore?

A. I remember that there is a barren space there, of considerable length.

Q. Of considerable length?

A. There is.

761 Q. Probably about 1,200 feet?

A. I think likely.

Q. And now, on either end of that barren space, are these chimneys of ore found going down into the ground?

A. Yes.

Q. In the vein?

A. Yes.

Q. Are they connected by any fissures, or fissure-planes, the bodies of ore on either side of that barren space, or by any ore-tracings across this barren space?

A. Through the Bullion ground?

Q. Yes, sir.

A. Not that I know of; but I have never examined the ground.

Q. You don't know whether they are connected through there, or not?

A. No; I have never examined that ground.

Q. Do you think that any body of ore in Ruby Hill can be entirely enclosed in solid limestone, without a fissure connecting it with other bodies?

A. Whether a body of ore——

Q. Any body of ore in these mines that you have been speaking of, can be entirely and really surrounded with limestone, without any fissure connecting it with some other body or ore-bodies?

A. Or some source of ore?

Q. Or some source of ore below?

A. I don't think there are any such; but it might be impossible to trace out the connection, with the developments that are made.

Q. Then you think that if there is any body of ore in there, apparently disconnected with the other bodies of ore, or with the
762 main fissure going down below, that there must be some connection that has not yet been found?

A. I think there is some fissure connection of the ore with the—I think the bodies of ore are connected with some fissuring of the limestone.

Q. Now, do you or do you not think that the main fissure from below, going on down into the subterranean depths, is between the quartzite and the shale?

A. It is in the limestone.

Q. In the limestone, between the quartzite and the shale?

A. Certainly; between the quartzite and the shale.

Q. Well, now, you have described in your affidavit where this quartzite and the shale are from 205 to 300 feet apart.

A. Yes.

Q. Where the shale and the quartzite are that far apart and the limestone is that wide. Do you suppose this great general fissure going down below comes up somewhere in that space between the shale and the quartzite?

A. At what space do you mean?

Q. For instance: you have said that on the 10th level of the Eureka the quartzite and the shale are 205 feet apart.

A. Yes, sir.

Q. Now, then, the limestone lies between them. Do you think that the general fissure that goes on down into the earth comes up or goes down between that shale and that quartzite?

A. At that point?

Q. Well, at some point along there. I don't say at that exact point.

763 A. I saw no evidence of fissure at that point.

Q. You saw no evidences there of fissure?

A. None at all.

Q. Well, did you see any evidences of where this fissure does go on down below?

A. Where it goes below what?

Q. Below the lowest workings.

A. I saw evidences of the fissure in the lowest workings of the Richmond.

Q. In the lowest workings of the Richmond?

A. Yes, sir.

Q. Well, in the lowest workings of the Eureka Consolidated, where you find ore, do you think there is a fissure there that goes on down?

A. In the lowest workings of the Eureka where I saw ore is on that northwest end of the 9th level.

Q. Well, do you suppose that is a fissure that goes on down?

A. I suppose that is a fissure that is striking in from the Richmond, as a spur of the Richmond lode, and touches the quartzite there and makes that deposit.

Q. And that is not a fissure which goes on down into the earth?

A. Well, that fissure would go on down into the earth, if it is a part of the Richmond lode. Suppose that fissure is standing here [showing] on defendant's model; here is where it comes down from the 7th to the 8th levels; if it strikes out there to the 9th level, either in to the main fissure or a spur, it touches the quartzite and makes that deposit. Here is where you see the lowest part of it, below the lowest glass plate; there is a winze down there 60 feet, and the fissure is traceable to the bottom.

764 Q. Now, then, suppose that 9th level ore-body is a separate body of ore lying on the quartzite. Do you suppose it connected below with some fissure going on down?

A. I presume it to be connected with some fissure. Wherever any body is there, so far as any study of the lode goes, I think it has—I think the body has some connection with some fissure.

Q. How is that? You understand that these immense fissures going down into the surface of the earth were confined within this limestone zone, why were they confined within the limestone zone?

A. Because they were made there, I suppose, more easily than elsewhere?

Q. Couldn't they cut through the shale?

A. I don't know but they do.

Q. You have never seen where they cut through the shale?

A. Never; I never had an opportunity of tracing them to the shale where they go in; they may cut through the shale; they may go under the shale altogether. The shale may give out in depth and the fissure continue below it; they may cut into the quartzite.

Mr. Wren.—Q. What is that last?

A. I say they may also cut into the quartzite. I don't know that they are confined to the limestone, but we see them developed mainly in the limestone.

Mr. Thornton.—Q. Well, you have seen some that you have not traced outside of the limestone, at any rate?

A. Oh, yes.

Q. Now, then, haven't you seen some run directly up to the shale and stop?

A. I don't remember any.

765 Q. Is not there one on the second level of the K. K., where a drift from the near shaft runs out to the shale, showing an immense fissure-plane running directly up to the shale?

A. The shale is about two feet thick and the drift runs on 30 feet beyond. I never saw any shale in the K. K. mine.

Q. Well, clay?

A. There is a cross-fissure. I think I know the one you mean, the one that crosses about north 10 west, that cuts over to what you have just called the clay, and a drift follows that seam, crosses the clay and is driven for 20 or 30 feet into the limestone beyond without showing a sign of that fissure, but that does not prove that the fissure does not go further.

Q. Well, haven't you seen a great many fissures that extend up to the quartzite and extend no further?

A. I have seen a great many that touch upon the quartzite, and so far as I can see, go no further.

Q. Now, what is the greatest length of that Richmond vein, as you call it, or Richmond pipe?

A. Bear in mind we can't get into the quartzite to follow them out, except in a few places.

Q. What is the greatest length of this Richmond vein, as you call it, or Richmond pipe?

A. Well, I call it a fissure-lode, and the greatest length developed of the lode I should measure by the distance and other traces along the line of fissure.

Q. Well, how long? What is the greatest distance you have traced there?

A. I would like to look at the map.

Q. Don't you remember? Didn't you testify to it in your affidavit, Mr. Hague?

A. I did not give you a definite distance that I remember;

766 I said that it could be traced for a good many feet—hundreds of feet. [Measures on the map.] Well, I should say the longest distance that I could trace that fissure would be five or six hundred feet.

Q. How long did you testify was the greatest length of it, in your affidavit?

A. I don't think I stated the greatest length of it.

Judge Sawyer.—What is that?

Mr. Thornton.—The Richmond.

Witness.—Speaking of the main fissure of the Richmond, I think I said it can be traced for hundreds of feet; I think that is what I said.

Judge Sawyer.—Didn't you say five or six hundred feet in a horizontal direction?

A. In a horizontal direction, but not continuously; the longest distance that I could trace it continuously on any one level might be—well, I don't know which is the longest place. I measure one here on the 3d level, which is 180 feet with the line of fissure going on in the end of the drift, still showing in the end of the drift. There may be longer places, one here on the 7th level. That expesed on the 7th level is 130-odd feet; but on the 6th level, from the most remote point from which I can trace the fissure, which I believe to be the fissure, the most remote point would be 600 feet apart, nearly.

Q. 600 feet in length, then, at one place?

A. Yes; but bear in mind I don't say it is continuous; but I traced that line of fissure plotted on the map, and believe it to be one line of fissure. Of course there is an expansion in that fissure of ore-body, where you lose sight of the main wall.

Q. Now, what is the greatest thickness at that point, where it is 600 feet in length, of the ore-body at any place?

A. The greatest width of an ore-body?

767 Q. Yes; the greatest thickness or width of an ore-body.

A. Well, on that level the width of it is not to be determined, because the ore is not stoped out. Thirty feet above that level we have the Potts chamber, which is a part of the expansion of this fissure; the width there horizontally might be, perhaps, 40 or 50 feet, take it on a guess.

Q. Now, if that vein is 600 feet in length—500 feet in length—and the greatest thickness of it is 60 feet, how is that in shape like a pipe?

A. Because a pipe is an ore-body which occurs in the line of fissure. Here we have a well-marked fissure; and, as I said before, I call it a fissure-lode, along the line of which occur these ore-bodies or chambers. We have here [referring to models] the fissure-lode,

the walls close together in places, with nothing between them, then expanding and forming this ore-body which, from the surface down, forms this pipe. I call it a pipe. I call the ore-body a pipe.

Q. You call such separate ore-body a pipe?

A. I call that ore-body a pipe. There may be other pipes there.

Q. You call the one ore-body all the way from the top down a pipe?

A. Yes, sir.

Q. And one pipe all the way from the top down?

A. Well, what I explained to you yesterday, that it was one pipe, but with strictures in it; the dip goes down like this [showing], then flattens off and makes a large body of ore; then another steep dip; then another body of ore. Different writers or different people might call call those different pipes. I call it one pipe of ore, a pipe.

768 I use the term pipe. The learned gentleman on the stand the other day spoke of fistula. Now, fistula is the Latin word for pipe; fistula and pipe are two words for one thing. That gentleman, in his more learned discourse, used the Latin word. I use the plain English—a pipe.

Q. Well, you have done better still; you have christened it with the very handsome and appropriate name of suasage-veins?

A. Yes, sir; I think that is a better name than all; it is a string of sausages.

Q. We accept your name for it in our discussions hereafter. Now, with reference to the water that you spoke of yesterday in the Eureka Consolidated: in the Comstock, was there not water in the Consolidated Virginia when the California and the Ophir were dry, and both deeper than the Consolidated Virginia?

A. You asked me about mines the water of which I have not kept track of.

Q. Well, don't you know those matters in your matter of knowledge of the Comstock?

A. Oh, yes; I know there are mines there; there have been mines there that are deeper than mines that have water in them, and I think I know why.

Q. Continuous mines, both working on the same ore-body?

A. Oh, I don't know that.

Q. Well that is the case in the Con. Virginia and Ophir and California. Now, don't you know that there was water in the Con. Virginia at a higher point than they were working in the California and Ophir when it was dry in the California and Ophir?

A. No; I don't know that.

Q. You don't know it?

A. No; I have not kept track of that thing at all.

769 Q. Don't you know, Mr. Hague, from your examination, that the water in the Eureka Consolidated runs in the drifts and openings, and not anywhere where it can be seen in the natural channel?

A. I never saw it anywhere except in the drifts and openings, not having been in any other place.

Judge Sawyer.—What is the distance from the ore in the Eureka Consolidated, from the place where this ore is, to the furthest extremity of the ore in the Richmond on the same level in horizontal direction?

A. That is to the nearest point.

Q. The furthest point in the Richmond in a horizontal direction?

A. The greatest distance between the two nearest points of those [showing on the map]?

Q. The two outer points?

A. The tracing of this flat chamber on this map is put on. I am am not sure if that is as wide as it ought to be, because the ground is now no longer accessible on that line, as put down partly from from former surveys. I am not sure. My impression is that that flat chamber has not been laid down with as great width as it should have been. There was a good deal of discussion at the time this map was made, and these points lie now inaccessible from the main openings. But, as shown on the map, the greatest distance from this point here—the distance from this point at the southeast end of the showing of ore on the map to point 59 of the Eureka map—would be about 170 feet. If you wish to know the distance from there to the most remote point here [showing], that would be this one added to it, and that would be 180 feet more.

Q. Called the Marguerite?

A. I can't testify as to that ore myself, for I don't know the ground.

770 Mr. Thornton.—It would only be the width of the exposure of the two, if your honor please. It ought extend further.

Re-direct examination:

Mr. Wren.—The width of this ore-body would have to be calculated in that direction, would it not?

A. I should say so.

Q. At right angles with the ore-body here [showing]?

A. That direction of measurement would be in the same sense as measuring this way.

Judge Sawyer.—I understood the witness that the length of this vein horizontally—I suppose that means from the outer portion up here to the Richmond—to here [showing] would be about 600 feet?

A. That is in the direction as to which I was giving evidence.

Q. What did you mean by the length of that lode thus? I asked you if you meant horizontally, I suppose you meant in this direction, not on the top?

A. No; this [showing] would be the top. This [showing] is the top in this direction.

Q. Which direction did you mean?

A. I meant 600 feet along the quartzite and course of the lead in which this pipe occurs; that is this way [showing].

Q. Did you take the outermost part of the lead in this direction from the outermost part here?

A. I took the outermost point at which I had seen traces of the line of fissure on either side of this ore-body.

Q. State your points of measurement.

771 A. At this point here, marked 67 on the Richmond map, I saw a part of what I call the line of fissure on which the ore-body has been formed; that is still going on, coming this way; it is seen here again near the shaft, and in the new work west of the shaft; it can be traced here in this new level; the 6th level striking it here to the northwest and going on indefinitely, at least I don't know how far it does go; the 600 feet I speak of is the greatest distance at which I can find two remote points on one level of the line of fissure, not speaking of the ore-body.

Q. On the same level?

A. On the same level, not speaking of this ore-body which lies between those remote points and along that line.

Mr. Wren.—Now, Mr. Hague, do you know the relative level of the ore-body found at the northwesterly end of the 5th level of the Eureka and the level of the flat chamber?

A. Pretty nearly. The fifth level of the Eureka is 300. You say the flat chamber?

Q. Yes.

A. This is 70 feet above the second level.

Q. Yes.

A. The flat chamber should be 50 feet above the 5th level of the Eureka.

Q. Then, with a dip that the ore has at the northwest end of the fifth level of the Eureka, it would pass between one and two hundred feet underneath the flat chamber, would it not?

A. I should think so.

Q. So that it is 170 feet in horizontal distance at the north-
772 west end of the Eureka 5th, where it would continue on the dip—that is, where it opened, disclosed—it would run nearly that much underneath the flat chamber?

A. That is my impression.

Q. There are some works, Mr. Hague; do you recognize any authors there who have a reputation as writers upon the subject of geology?

A. Professor Philips I recognize as an author with whose name I have long been familiar. David Page I have not known so long, although I have heard of him and his book before. Anstead is a familiar name in geology.

Q. Do you find descriptions of pipe-veins in those works? I will simply offer those books in evidence.

A. Well, here is one.
Q. In what work?
A. In Phillips'.
Q. Is it long.
A. A part of a page.
Q. What is the page?
A. Page 534.
Q. Any of the other works that you find descriptions of pipe-veins in?
A. In David Page I found one here, on page 147.
Q. What book is that?
A. "Economique Géologie," by David Page; description of pipe-veins and other veins on page 147. Geological Science, including the Practice of Geology and the Elements of Physical Geography, by Professor G. G. Anstead; pipe-veins described on page 265.
Q. You were engaged with the United States geological survey of the 40th parallel, you said in the opening of your testimony?
A. I did; yes sir.
773 Q. While connected with that survey, did you make any examination of the Comstock?
A. I made an examination of the Comstock chiefly with reference to the engineering of the mines.
Q. In that examination did you examine the mines?
A. I examined the mines.
Q. Is there any resemblance between the Comstock and Ruby Hill mines?
A. Only a very general resemblance.
Q. The Comstock is a compart-vein, is it not?
A. Part of the way.
Q. During the greater portion of the way, are the Ruby Hill mines on a contact-vein?
A. I think not.
Q. The Comstock is in volcanic or eruptive rocks, is it not?
A. Yes, sir; mainly.
Q. The Eureka veins are in sedimentary rocks?
A. Yes, sir.
Q. Would you expect to find any difference in the form of veins arising from that fact?
A. The form of the fissures vary very much; they are apt to vary with the character of the rock.
Q. What modifying influence would be likely to operate upon the rocks in which the Comstock are situated, and what in rocks in which the mines of Ruby Hill are situated.
A. I don't understand the question.
Q. After the formation of the fissure or fissures in which these mines are formed, would they be likely to be modified in their form by any agency?
A. I think they would very much, in the limestone.

Q. Would they be likely to in the other rock?

A. Not so much.

774 Q. You think they would be modified very much in the limestone?

A. I think so.

Q. You have described the method of modification already. The Comstock is generally recognized as a great fissure-vein, is it not?

A. I believe it is so recognized generally.

Q. What do you consider it?

A. Well, I have never studied the lode with reference to that question.

Q. What is the accepted theory, or what is your theory in regard to the appearance of horses or masses of country rock in the Comstock?

A. I think horses or fragments have fallen in from the country rock from the hanging wall.

Q. Is it your opinion that any of the horses, no matter what their size, maybe still remain in the position they occupied before the formation of the fissure, or do you think they have slidden into the fissure?

A. Well, I judge that most of them have moved somewhat; there may be large fragments there that are separated by fissures that have not fallen far in the fissure.

Q. Do you know what the barriers or boundaries of the ore-chimney, so-called, found in the Comstock, are?

A. Do you mean the material that bounds them?

Q. Yes.

A. Clay, I believe.

Q. Sir?

A. Clays, often.

775 Q. Are they bounded in no other way? Take the length of the lode, the boundaries along the length of the lode. What are they situated in; what are they found in?

A. Found in fissures, in quartz.

Q. In quartz?

A. Certainly.

Q. Then the chimneys of ore that are found in the Comstock are in the quartz?

A. Yes, sir.

Q. And the quartz in which they are found is of the same origin and same date as the deposits of the ore that are found in the quartzite, is it not?

A. I suppose it is, mainly. I think, however, there may be quartz of different age.

Q. Well, your idea is that the quartz was deposited in the same mode——

A. Same mode; yes.

Q. [Continuing]—that the ore that is found in the ore-chimneys was deposited?

A. That is my idea; that they were introduced in the same method.

Q. Do you think there can be what is called a pipe-vein situated inside of a fissure-vein; or, in other words, that a pipe-vein, properly so called, can be found inside of the vein material of a lode?

A. No; I think a pipe-vein may occur along the line of a fissure, but not included in the fissure.

Q. That is, not included in the gangue with which the fissure is filled?

A. No.

776 Q. Is not that just the distinction between pipe-vein and chimneys of ore—that the ore is a vein bounded by the country rock on all sides, while the other is a rich bunch or body of ore found in the vein material of the vein?

A. Well, I think that would be a very good distinction; I do not think that the distinction itself is so very rigid that you can always say just what it means. I think the name just describes the form of the body. But what have been called pipe-veins, and are described as pipe-veins, generally do occur in that way; that is to say, in country rock, inclosed in country rock, and not as fissures, along the fissure, in a fissure-vein, within a fissure-vein.

Q. I have already understood you to state that this pipe is bounded by the country rock?

A. It is; yes, sir.

Q. On all sides; and not by the vein material of the fissure.

Judge Sawyer.—Q. What do you call the country rock in the mine?

A. Limestone; that is the inclosing rock that inclosed the lode.

Mr. Wren.—Q. In your answers to Mr. Thornton, you said that the ore came from some fissure that went down, in your judgment. Did you mean that the ore, all of the ore in the mines on Ruby Hill, came from a single fissure?

A. No, sir.

Q. What I understood you yesterday was, that there were certainly two fissures, and probably two systems of fissures.

A. I think two fissures; I should describe them more properly as two systems of fissures. I don't think there is merely one fissure.

777 Q. And the ore of the Richmond was derived from the one set of fissures, and the other from the other set of fissures?

A. The ores of the Richmond are due to the formation of one system of such fissures, and those of the Eureka to another and separate set of such fissures.

Q. Is it your opinion that the ore-bodies in the Eureka are connected by fissures with the ore bodies in the Richmond?

A. I see no evidences of it unless you refer to the body of the 9th level there in the northwest end of the Eureka.

Q. There is an immense amount of clay found in the Comstock, is there not?

A. Yes, sir.

Q. Are not fissures found running in various directions, not only through the porphyry inside of the Comstock lode, but through the bodies of ore, filled with clay; or do you know?

A. I don't know positively. I believe so. I told you before that my examination of the mines was chiefly with reference to the methods of working and not with reference to the study of the structure of the lode.

Q. Well, if that be the case, those fissures filled with clay would form a barrier to the free circulation of the water throughout the lode, would they not?

A. They often do.

Q. Are there any such fissures found filled with clay cut through the body of the limestone on Ruby Hill, in various directions, that would form any barrier to the passage of the water.

A. I don't know of any such.

778 Q. Do you know of any cross-fissures containing clay or any other substance that would form any barrier to the passage of water running between the Richmond pipe and the Eureka pipe, or between the point at which the water comes in to the 9th level of the Eureka and the Richmond pipe of ore?

A. I never saw any such thing.

Q. Do you know of anything between those pipes that would prevent the free passage of water except the solidity of the rock between them?

A. That is the only thing I can attribute to it.

Q. If the Richmond workings are very much deeper than those of the Eureka Consolidated, the water from the higher workings, if there was no barrier, would flow freely into the Richmond mine, would it not?

A. Under ordinary conditions one would naturally expect that.

Q. What influence would a little bulkhead have upon that flow, built in one of the drifts or cross-cuts from which the water is run out; any at all?

A. The bulkhead can only check the water in that drift where it was put up.

Q. The Comstock is quartz, is it not? free milling ore?

A. The gangue of the vein and the ore in quartz.

Q. It is milling ore, is it not?

A. Certainly.

Q. What kind of ore is the ore of the Eureka mines?

A. A leady ore; smelting ore, commonly called.

Q. Would the fact that limestone is stratified or unstratified have any influence upon the formation of pipe-veins in the limestone?

A. It might have something to do with determining the form as the fissure.

Q. In what way?

779 A. Might determine it, sir—the dip of the bodies of ore—or it might not. As a rule I should look to the stratification of limestone to have some effect upon the way in which the fissure would open. I think it may have had in this case. I think this limestone was stratified once; there was a time, probably, when it was stratified, and it may have had something to do with the determination of the form of the pipe.

Q. May pipe-veins as well occur in unstratified as in stratified limestone?

A. I have heard of them occurring in that way.

Q. The unstratified limestone would dissolve just as readily after being fissured as the stratified, would it not?

A. I presume so.

Q. This is a book written by Mr. Wallace [showing] that was offered in evidence when Professor Whitney was upon the stand, containing two diagrams. There is a diagram of the vein. What kind of a vein would you call that from the diagram? Would that be very nearly like one of your sausage-veins?

A. Yes, sir; I should say it would be a very good sausage-vein, with rather long structures.

Q. With a little alteration in the dip at certain points it would not make a bad diagram of this Richmond vein, would it?

A. With some alteration. The closings are rather long. This would do very well for an idea of this vein, in some respects.

Q. I understood you to say that you found no shale in the K. K?

A. I found no shale in the K. K.

Q. You do find a clay seam there?

A. Yes, sir.

780 Q. There is a representation on this model of an ore-body found in the Margaret at the northwest end of the Eureka 5th level, which I would like to have you look at and see whether it would show the relative positions of the flat chamber and that ore-body?

A. [Examining the model.]—The flat chamber is above the 5th level, about as I stated in my evidence, I should think.

Q. Is this the flat chamber [showing]?

A. That is understood to represent the flat chamber, the bottom of it down here.

Q. And is that the ore-body found in the Margaret?

A. I believe so.

Q. If this is a correct representation, then the ore-body found in the Margaret would dip away in under that chamber?

A. Even deeper, I should think, than you point on that section.

Q. And the dip of the 9th level of the Eureka is not represented there?

A. No, sir; it cannot be shown very well between these plates.

Q. The dip would come down along here [showing] while the

dip of the ore in the Margaret would run away off in a different direction, northwest?

A. Yes, sir.

Q. In answer to Mr. Thornton, when he asked you about the length of the fissure, you were testifying to the length of the fissure and not the length of the ore-bodies connected with the fissure?

A. I had no reference to the ore-body; I was answering his question, which I understood to be, what was the greatest length that I could find of the line of fissure.

781 Q. You don't know whether that ore-body on the 9th level of the Eureka is on the Richmond fissure or not, but merely state that they may be?

A. I don't know; I haven't seen the developments to show it, but I think it may be.

Q. The quartzite is shown at the end of the 9th level of the Eureka, isn't it?

A. Yes, sir; or near the end.

Q. It is also shown in the 6th level of the Richmond, isn't it?

A. Yes, sir.

Q. Now, isn't it evident from the points at which the quartzite is shown on the northwest end of the 9th level of the Eureka, and the points that it is shown on the 6th level of the Richmond, that the Potts chamber does not touch the quartzite, or come anywhere near it?

A. I see no evidence of the Potts chamber touching the quartzite.

Q. Can't you see that from its position on the sixth level of the Richmond, that the dip of the quartzite would have to be entirely reversed, and would have to dip to the southwest at a high angle, in order to touch the ore in the Potts chamber at any point?

A. Do you mean that the ore would have to dip?

Q. No, sir; I mean that the quartzite would have a dip to the southwest. Here is the quartzite shown on the 6th level of the Richmond. The 6th level of the Richmond is 100 feet lower than the 5th, isn't it?

A. Yes, sir; about.

Q. The dip of the quartzite, as testified to by all of the witnesses, is to the northeast?

A. Yes, sir; generally.

782 Q. And the quartzite, as shown on the 6th level, is at least 40 or 60 feet to the southwest of the ore in the Potts chamber, isn't it?

A. The ore of the Potts chamber approaches the quartzite here, nearer than 60 feet.

Q. I am speaking of the quartzite on the 6th level below the Potts chamber, 100 feet.

A. There are stopes on the 6th level back here [showing].

Q. I am trying to get the relative position of the quartzite on the 6th level and the quartzite on the 5th level.

A. The tracing of the ore is not here on the 6th level. I don't understand your question.

Q. Does that 5th level cut the quartzite at any point?

A. The 5th level touches the quartzite at a single point.

Q. What point is that?

A. Back in here [showing].

Q. About how far from the southernmost end of the Potts chamber?

A. As shown here on this model, about 80 feet; something like that; I can't say exactly, without knowing exactly where the point is.

Q. Then the quartzite don't approach the ore in the Potts chamber nearer than about 80 feet on the 5th level?

A. No, sir.

Q. The Potts chamber is on the 5th level?

A. Yes, sir.

Q. Does the shale touch the ore in the Potts chamber, or does the ore touch the shale at any point?

A. No, sir; not that I know of.

783 Q. What is the distance horizontally from the ore found at the northwest end of the 9th level of the Eureka and the ore in the Potts chamber of the southwest side?

A. As nearly as shown by this model, I should say 150 feet.

Q. The Potts chamber and the ore-body in the northwest end of the Eureka 9th level are about on a level with each other, are they not?

A. Somewhere near.

Q. The distance is shown on the model?

A. Yes, sir.

Q. The 9th level is about 30 feet lower than the top of the Potts chamber?

A. Yes, sir; about 30 feet.

Q. What is the distance horizontally between the ore found at the northwest end of the 9th level of the Eureka, and the west and southwestern boundary of the ore-body found on the 6th level of Richmond, measuring horizontally to a point perpendicular below the ore on the 9th level?

A. I cannot get it very closely, but I should think it was about the same. There is not much difference; that is, measuring from the southwest end of the ore developed on the 6th level, to a point vertically below the tracing of the ore on the 9th level, above it.

Q. What lies between the ore in the Potts chamber and the ore at the northwest end of the 9th level of the Eureka?

A. Limestone.

Q. Solid, barren limestone?

A. Barren limestone.

Q. Were you not with Mr. Westcoat and others when they went into the K. K. mine recently?

A. No, sir; I was not with them.

784 Q. You never were at the point described by Mr. Westcoat, where what is called the interior limestone and the clay gives out, and the outside shale and the quartzite come together?

A. No, sir. The outside shale?

Q. The ore that was in yellow on the map.

Mr. Thornton.—It was the outside limestone come together with the quartzite, cutting out the shale.

Mr. Wren.—The outside limestone, then, shut out the shale?

Mr. Thornton.—The 5th level ore-body of the Potts chamber, as represented here on this plate of glass [showing], extends down to the 6th level, and goes on around there the same body of ore, and is represented by the red there?

A. Yes, sir; that is, continuous ore. [The witness described the the different locations on the model].

Q. Then, if that part of the quartzite [showing], after it has turned back along the line of my stick, dips in that direction, it would dip to the Richmond vein, and keeping up its dip, wouldn't it?

A. If I understand you, it would.

Q. And this part of the quartzite that is represented here, if it keeps on its normal dip, would come under that body of ore?

A. You mean at some distance in depth? Certainly.

Q. Now, then, does this model show where the drift from the stopes of the Potts chamber touches the quartzite at the point 69 D?

A. No, sir; it cannot show it on this model, because it is between these two plates. The drift reaches the 6th level at 69 D, and is between the two levels.

Q. With your rule point out about where it was between the two levels?

785 A. [Showing]—I believe that is 31 feet above the 6th level, although it is represented on the 6th level plate.

Q. We come along now to that drift from the letter "G" to the the word "Ground," to 60. Does that drift from 60 to 69 D run along on the quartzite; and it runs along between the quartzite and the anterior layer of the limestone?

A. Yes, sir.

Q. The quartzite extends in that direction.

A. Presumably.

Q. And the ore-body is found rising on the quartzite?

A. Yes, sir.

Q. And there the quartzite is found at that point again [showing]?

A. Yes, sir.

Q. Now, the difference in level between this drift in yellow of the Richmond and the 9th level, as it comes straight out through that ore-body, is at that point 35 feet at that winze?

A. About that.

Q. Then we have the quartzite extending from 60, along behind that ore-body, in that direction. Now, if it dips on down, it will come under Potts chamber, will it not?

A. No doubt, at some depth.

Q. Did you watch the tracing to see whether ore could be traced along this drift from the edge of the Potts chamber to that other chamber?

A. Yes, sir.

Q. What is your opinion about that tracing?

A. I don't find any ore in this end of the drift. I found no ore within 12 feet of the quartzite at that point [showing].

786 Q. Is it your opinion that in the Potts chamber itself a part of the ore-body was worked out, and that the croppings on the 9th level of the Eureka are part and parcel of the same vein?

A. I think one is a spur of the other.

Q. And that they could be connected?

A. My impression is that they would be very likely to be connected.

Q. In tracing down between the 200 and 400-foot levels of the Richmond, isn't there a barren space of some 60 feet, where there is no ore?

A. In those winzes there is a very small seam of ore almost all the way.

Q. From the flat chamber down to the second level?

A. From the flat chamber down to the second level there is ore all the way; a small seam of ore.

Q. Is there any place in that connection where there is a barren space of 60 feet?

A. No, sir. I don't remember any such space of 60 feet. In this winze the ore gets to a very small and thin seam.

Q. What is the extent of the barren place?

A. Between the third and fourth levels the ore in the winze that I went down often gets very small. A little ways in front of that fissure on which that winze is, there is another fissure not more than 30 or 40 feet through this deep fissure, divided by limestone, and in that fissure I have been up some distance from the fourth level at the point that would be opposite this, and have followed ore. On my later visit I was unable to get in, on account of my accident. There has been ore traced from there up since that time. That connection is supplied in that fissure from there up to the second level. I was through a part of the way, and above the point which is barren of ore.

787 Mr. Wren.—Q. There are two or three sets of winzes passing down from the 2d level to the 4th level, are there not?

A. There are two sets of winzes, I believe.

Q. Has there been another set of winzes since you were down there?

A. I was just speaking of those.

Q. Are there not two sets of winzes at the point where you went down, and another set siill further over to the northwest? Don't you know that there is a winze over to the northwest that is called the limestone winze?

A. A winze that I have not seen?

Q. I don't know whether you have seen it or not.

A. I know the winze that I went down, and another set of winzes have been traced since.

Q. I mean from the 2d down to the 4th.

A. I know the limestone winze between the flat chamber and the 200-foot level, which was made for the shoot. That is the usually traveled way. I believe that one is here, and another down here [showing]; that is from the flat chamber down to the foot of the 200-foot level—goes through barren limestone.

Q. Do you know whether those gentlemen who have been through the mine to the Eureka, have persisted in going down that all of the way.

A. I don't know.

Mr. Lansing.—I will now read in evidence the mining laws of the Eureka Mining District, which we will mark "Defendant's Exhibit No. 4." [Reads.]

We also offer in evidence the notices of location of the Utah claim and the Arctic claim, and also the Utah No. 2, marked "Defendant's Exhibit No. 5."

The Court.—Is there any objection to these locations?

788 Mr. Thornton.—We have no objection to the form of the notices.

Mr. Wren.—It is a stipulation that the notices may be put in in the form they are; and they are proof of the contents of the original notices and the record of the notices in the books of the mining recorder in the Eureka Mining District.

Testimony of JOSEPH POTTS, called for defendant, sworn.

Mr. Wren.—Q. Did you locate the Utah claim on Ruby Hill?

A. I did.

Q. Look at this printed notice [showing] and see whether this is the copy of the notice of location you posted on the ground.

A. That is a copy of it.

Q. Did you also locate the Utah No. 2?

A. Yes, sir.

Q. Is that a copy of the notice of location you posted on the ground?

A. Yes, sir; it is.

Q. Did you mark the boundaries of those claims, so that they could be readily traced?

A. Yes, sir.

The Court.—Do you contest the fact that they made these locations?

Mr. Thornton.—No, sir; but they can put this formal proof in that he is offering. The dates of them are material, and little matters of that sort: to show that they complied with the law. They may not have made valid location.

789 Mr. Wren.—Q. Had the ore-body that is disclosed in the workings of the Richmond mine, been discovered underneath the surface of the Utah, at the time the location was made?

A. Yes, sir.

Q. The flat chamber had been worked out, hadn't it, long prior to the location of that claim?

A. Yes, sir.

Cross-examination of JOSEPH POTTS:

Mr. Thornton.—Q. At what distance below the surface is the dip of the flat chamber, the highest point that you had worked out ore underground?

A. About 500 feet.

Mr. Wren.—Q. You are a citizen of the United States?

A. Yes, sir.

Q. And was, at the time you made the location?

A. Yes, sir.

Q. Do you know anything about the location of the Arctic; or was that made by Mr. Ricard?

A. Mr. Ricard made the location; and Mr. Isaac Hamilton.

Mr. Wren.—I will offer in evidence a deed from Joseph Potts to the Richmond Mining Company of Nevada, the defendant, marked "Defendant's Exhibit 6." It conveys two of these claims.

Mr. Thornton.—That is to show the conveyance of the Utah No. 2, to the company?

Mr. Wren.—Yes, sir.

Mr Thornton.—We have no objection to that deed.

Mr. Lansing.—We next offer a deed from John B. Magee to the Richmond Mining Co. of Nevada, of the Utah, marked "Defendant's Exhibit No. 7." Also, a deed from R. Ricard to the Richmond Co. of Nevada, of the Arctic, marked "Defendant's Exhibit No. 8."

790 Testimony of WILLIAM ASHBURNER, called for defendant, sworn.

Mr. Wren.—Q. What is your profession?

A. That of mining engineer.

Q. Where were you educated in your profession?

A. I began my studies at the scientific school in Cambridge, Mass.; afterwards went to France and continued my studies at the

School of Mines, in Paris, for four years; since which time, in 1854, I have been engaged in the practice of my profession.

Q. Have you visited Ruby Hill and the mines in controversy, and those adjacent thereto?

A. I have. I visited the Richmond, the Eureka Consolidated, the K. K., and the Phœnix.

Q. How recently.

A. I visited them first in March last, and since then during the month of July.

Q. For how many days were you engaged in the examination of the mines, in March last?

A. If I recollect rightly, I was engaged in the examination of the mines and the surface of the ground, nine days last March.

Q. Did you, during that time, have the assistance of Mr. Hague and the advantage of a good map of the claims to direct you?

A. Yes, sir.

Q. So that your attention was at once called to all of the material points?

A. I took notes of the important points throughout the mine, being guided by maps which had been made by them and under their direction.

Q. When did you last visit these mines?

A. Last week.

Q. How many days did you spend examining those mines?

791 A. I was there six or seven days, immediately engaged in it. I was absent from here about two weeks, but engaged in examining the mines about seven days.

Q. Did you, during that time, collect any specimens from the surface and underground workings?

A. I did, sir.

Q. What was the character of the examination that you made of the surface and underground working in selecting the specimens?

A. It was very thorough. I selected specimens from a great number of places on the surface, and from several levels of the Richmond. I think I selected in all about 100 specimens. When I say "I," I mean that I selected them in connection with other people.

Q. From what portions of the surface, as shown on that map, did you select your specimens?

A. Number 1, from a section of the northwest end of the Antarctic, taken from a slight limestone elevation, a few inches below the surface, and presents the appearance of the ordinary limestone of the period, though perhaps somewhat harder than usual. The general features of this section do not present any striking peculiarities.

Q. Where did you take the next specimen from?

A. From section 3 of the Antarctic, near large boulder. This specimen was much softer than No. 1, and shows a brecciated ap-

The Court.—Do you contest the fact that they made these locations?

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Q. How many days did you spend examining those mines?

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Q. Did you, during that time, collect any specimens from the surface and underground workings?

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Q. What was the character of the examination that you made of the surface and underground working in selecting the specimens?

A. It was very thorough. I selected specimens from a great number of places on the surface, and from several levels of the Richmond. I think I selected in all about 100 specimens. When I say "I," I mean that I selected them in connection with other people.

Q. From what portions of the surface, as shown on that map, did you select your specimens?

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Q. From what portions of the surface, as shown on that map, did you select your specimens?

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Q. Where did you take the next specimen from?

A. From section 3 of the Antarctic, near large boulder. This specimen was much softer than No. 1, and shows a brecciated ap-

pearance. Limestone generally in that neighborhood appeared the same as the specimen.

Q. Where was the next one taken from?

A. From section 6 of the Antarctic, at a point marked 3. The limestone at this point was partially covered with detritus. The specimen was taken from a few inches beneath the surface.

792 Specimen No. 4 was taken from section 7, at or near a shaft 20 feet deep.

Specimen No. 5 was taken from the Antarctic, from a point marked 5 on the map, 34 feet from the southwest corner of limestone, and from an outcrop.

Specimen No. 6 was taken from section 11, 25 feet from the northwest corner. Limestone bold, prominent and hard.

Specimen No. 7 was taken in the railroad cut, 65 feet from the westerly line of the cliff. It was taken from somewhere near the railroad cut. The specimen is surrounded above and below by shale, and about 8 feet below the surface.

Specimen No. 8 was very near to No. 7, but on the opposite to the north side of the railroad cut.

Specimen No. 9 was 29 feet westerly from section 2 of the Antarctic, from a small cavity made by a blast. This cavity is the limestone, and there is a small seam of yellow ochrey matter.

Specimen No. 10 is taken from between the Richmond shaft and the Atlantic, above the road, and from a ridge of limestone.

Specimen No. 11, westerly from the northeasterly corner of the Atlantic, near the end of the stope, from the limestone. The rocks had fallen down from the top, and ore lying on all sides.

Specimen No. 12 was 13 feet westerly from the northwest corner of the Atlantic.

Specimen No. 13 was 22 feet from the northwest corner of the Atlantic, 9 feet from where No. 12 was taken.

No. 14 was taken 67 feet westerly from the westerly end of the Arctic claim, from the outcropping of limestone about three feet high.

793 Q. All of these were on the outside, and many others that you took, were they not—outside of what they call the clay seam of the Bell-shaft tunnel?

A. Yes, sir.

Q. You took a great number of specimens from between that seam and the quartzite, did you not?

A. Yes, sir.

Q. All of those specimens were taken from the solid rock, were they?

A. Yes, sir; they were taken from the solid rock.

Q. With a sledge-hammer and pick?

A. Yes, sir; nearly every specimen; and I am not sure but every specimen required the efforts of a pick, sledge-hammer, and sometimes a gad, to bring them off.

Q. What was the character of the rock found to be, throughout the surface, as to hardness and toughness?

A. As a rule, it was very hard, solid, and compact limestone.

Q. Do you recollect about how many specimens you took from the surface along that line across the hill, or near there?

A. I must have taken about 44. I have 44 numbers in my book; but in those there may be some special specimens. But there are certainly 40 specimens.

Q. In taking those specimens, did you also make a careful general examination of the surface?

A. I did, sir.

Q. Is there any difference in the general appearance of the limestone lying between what is called the clay seam at the Bell-shaft tunnel and the shale, and that lying between the clay seam of the Bell-shaft tunnel and the quartzite?

A. None that I could detect.

Q. Was there, or is there, any difference in the general ap-
794 pearance of the limestone called exterior limestone by the defendants and that called interior limestone by them?

A. None that I could detect.

Q. What amount of limestone is the main body of the limestone of Ruby Hill?

A. It is limestone that is more or less magnesian. It very rarely has magnesia enough to be called dolomite. Very frequently it has an amount of magnesia varying from 6 to 7 to 7½ per cent.; it is not even what would be called by mineralogists dolomitic limestone, because it is necessary to have in the neighborhood of 20 to 27 per cent. to class the limestones with the dolomites. It might be called magnesian limestone.

Q. Would that amount of magnesia naturally affect either the toughness or the hardness of the limestone?

A. I don't think it would.

Q. It is pretty nearly what you would call pure limestone?

A. It is what I would call ordinary limestone.

Q. All limestone contains some magnesia?

A. Yes, sir; generally. There are some limestones, like marble, that are very pure. But it is rare to find limestone that does not contain more or less magnesia.

Q. Did you take any specimens from the exterior of the hill, on the outside, and the inside, or the interior?

A. I took a series of specimens from the Lizette tunnel, and also from the Ruby Hill tunnel.

Q. The Lizette tunnel is inside of what is called the vein by the defendants?

A. Yes, sir; it forms a part of the workings of the Richmond mine, or Ruby Hill tunnel, and is on the outside of what the plaintiffs call the vein; so I understand. I took fourteen speci-

795 mens from the Lizette tunnel and the immediate vicinity, and seven specimens from the Ruby Hill tunnel.

Q. Please give the numbers of those specimens, and the point from which they were taken.

A. The Lizette tunnel, from the end of the Lizette tunnel, and from the foot of the ladder going up to the Champion ground, called, I believe, the Champion winze. Number 46 was from the Lizette tunnel, 19 feet from 45, toward the mouth of the tunnel. Number 47 was 42 feet from 46. All of these numbers are going now toward the mouth of the tunnel. Number 48 was 123 feet from 47; number 49 was 89 feet from 48; number 50 was 61½ feet from the Rossiter incline and 8 feet from the ore-body; number 51 was 75 feet from 50. Two samples from this point were taken, one blue and one white. They were both taken within a few inches from each other. Number 52 was taken from the same place, the blue and the white forming a close contact, adhering to each other. Number 53 was 43 feet from 52; number 54 was 31 feet from 53; number 55 was 96 feet from 54; number 56 was 98 feet from 55; number 57 was 111 feet from 56; number 58 was 14 feet from 57; number 59 was 23 feet from 58. That is all.

Q. And from what points did you take the specimens in the Ruby Hill tunnel?

A. Number 30 was taken from the far end of Ruby Hill tunnel, outside of the shale and exterior limestone, as it is called. Number 61 was also taken from the same tunnel, and 42 feet from 60. Number 62, 28 feet from 61. At this point two samples were taken of blue and white limestone. Number 63 was eighteen feet from 62. Number 64 was taken from the same place as 63. Number 65 was 60 feet from 63 and 64. Number 66 was 27 feet from 65.

796 Q. During the time you were taking those specimens did you make a careful examination of the limestone in both tunnels, in order to ascertain whether there was any difference or not in their general appearance or structure?

A. I did, sir.

Q. What was the result of that examination?

A. Frequently the color is different, as is shown by some specimens. But, as a rule, the limestone was remarkably hard, compact, and solid.

Q. You found several varieties of limestone in either tunnel, did you not?

A. So far as the color is concerned. In fact, you find in the tunnel, which is claimed to be in the anterior limestone, as great a variety as you do in the limestone outside. Two specimens will differ much among themselves as they will in the outside and inside.

Q. Did you find any appearance of stratification in the Ruby Hill tunnel, or in the Lizette tunnel?

A. I don't think I did, sir; I didn't notice any.

Q. Did you find any appearance of stratification on the outside, either in the interior or exterior limestone, so called?

A. There is the appearance of stratification in the railroad cut. I saw no difference beween what is termed the outside limestone and the inside, in the vicinity of the vein.

Q. There is a small amount of stratified limestone shown at this point along the railroad, is there not?

A. Yes, sir.

Q. But that is entirely to the northeast of the shale?

A. It is entirely to the northeast of the shale.

Q. A different limestone from that lying between the shale and the quartzite on Ruby Hill?

797 A. Yes, sir.

Q. Did you find any stratified limestone in what is called the vein by the plaintiffs, at any point?

A. It is hard to say what is called a vein by the plaintiffs. I find stratified limestone in the lower workings of the Richmond mine; inside of the shale, and between the shale and the quartzite.

Q. Did you visit the Carson mine, just above the road, to the southeast of the K. K. hoisting works?

A. Yes, sir.

Q. Did you find any stratified limestone in the vein at that point?

A. I saw the stratified limestone on the surface at what I believe is called the Carson claim. It bore every indication of stratification.

Q. Did you trace that for any distance to the south?

A. I think it went 200 or 300 feet. I don't know certainly.

Q. Do you recollect whether it lay immediately upon the ore at the Carson outcrop, or not?

A. No, sir; I don't recollect that. I have same notes here of the stratified limestone from the eighth and ninth levels, if you desire them.

Q. You may give me those now.

A. From the eighth level of the Richmond, specimen number 77 is from stratified limestone, 9 feet from 76. Number 76 is taken 26 feet from 75, which is a specimen of lime from the contact with the shale.

Q. You have passed down from the top of the Tip-Top incline along the Richmond lode to the lowest workings, haven't you?

A. Yes, sir; quite frequently.

Q. What do you find passing down from the top of the Tip-Top incline to the lowest workings?

798 A. Beginning at the Tip-Top incline, I passed down that incline, which is now underneath that ore-body; because the old works have somewhat fallen in; but on one occasion I was nearly through the whole ore-body down to the foot. I passed down this ore-body down to its foot on the level of the Lizette tunnel, and at the head of the exterior incline; thence down the Rossiter incline,

and down through the old workings of this ore-body; thence down this winze to the 200-foot level; thence down, following a well defined plane, to the level of the 300-foot level; thence about, if I recollect rightly, 20 feet easterly, in order to connect with the plane which is struck in this winze, but is connected by means of the cross-cut; thence down into this old ground of the fourth level; thence through the Potts chamber down to within about 40 feet of the bottom of the 800-foot level. In that way I passed through a nearly continuous body of ore the whole distance; and where the ore was not continuous there was a well defined fissure-plane, showing, in my opinion, the line of contact between two ore-bodies. The distance where there was no ore was very slight indeed. In fact, I could not say really that there was any ore the whole of the way.

Q. Did the rock throughout that distance have the irony appearance of the body of a lode?

A. Yes, sir; the distance traversed in that manner I believe to be about 1,700 feet.

Q. In your opinion, what should that ore-body be called?

A. I should, until within the last day or two, have called it a pipe-vein. But that seems to be such a red rag. I regard it very decidedly as entering into the class of ore deposits and ore-
799 bodies known as pipe-veins, so called, from their peculiar shape; not that there is anything particular or peculiar in their mode of formation. It is the shape of the ore-body that gives it that distinctive name; the tubular shape of the tunnel—more or less tubular. It is a body in which the two short axes are very nearly of the same length, and are so much shorter than the principal long axes. Generally, in ore-bodies, there are two long axes and one short one. Here, there seems to be two short ones and one long one.

Q. Did you examine the ore-bodies shown in the workings of the Eureka?

A. Yes, sir; as far as they could be examined.

Q. In your judgment, how should those ore-bodies be classed?

A. I should class them, probably, as pipe-veins also. They are not so typical an example of pipe-veins as the Richmond body, but their mode of formation, I think, was undoubtedly similar, and they belong to the same general class of deposits.

Q. What is your opinion about the ore-body at the Richmond and the ore-bodies found in the Eureka being upon the same fissure or system of fissures?

A. I don't think they are. I think that the deposits which are found in the Richmond belong to an entirely different system from those which are found in the Eureka. The distance which separates them must be several hundred feet; and as shown by the underground develpments in the Eureka, the distance which you have to traverse from the main workings of the Eureka seems to have a general direction of northeast and southwest, while these of the Rich-

mond have a direction almost parallel, and that must be several hundred feet through, the most of which is barren limestone.

800 Q. Between the Lawton shaft and the ore-body found at the northwest end of the Eureka 9th level, what do you find exposed by the workings? Please state that fully.

A. At the 9th level of the Eureka, and beginning at 90, there is ore and quartzite. At 91 this ore is mixed with quartzite and silicious matter, as well as lime. From 95 to 96, all in lime down to the contact with the quartzite. At this point, on close contact with the quartzite, no ore or vein. From that down to 97, passing in this manner, it was also in lime; thence to 98, which is the top of the winze going down to tho 10th level. From 97 to 99 it is all in limestone. At 99, where the quartzite crosses this drift, the contact is closed, and there is no vein from 99 to 99 A, passing around in this manner. At 99 A there is a small amount of ore. Thence we passed in quartzite to 99 B, where there is no ore or vein. Thence in the limestone to 99 C, where there is another contact with the vein or ore. From 99 C to 99 D there is 61 feet where there is close contact with quartzite, without any ore or sign of ore, although at that point, 99 D, there is a little irony matter.

The Court.—Q. What is the whole distance?

A. Several hundred feet.

Mr. Wren.—Q. You also examined the 8th level?

A. Yes, sir.

Q. Please state what you found in the 8th level of the Eureka?

A. I will begin from shaft about 83, which passes in quartzite. At 83 there is a contact with limestone, where there is shown very little ferruginous matter; no ore properly so called. From 83 to 84 is in lime, where there is a cross-cut to the right, connecting with ore-stopes. At 84 there is to be found a fissure-

801 plane cutting diagonally across the drift From 84 to 85 is in lime, and at this point 85 we meet the contact with quartzite, but no ore or sign of vein at that point. From that point to 86 we continue on in quartzite to 87, where there is a close contact, and no sign of vein. Also, there is a decidedly orey indication here. But at this point here [showing], the ore has no connection with the quartzite; that is near 86. I should judge it was about 18 feet from 86. From 85 to 87 the drift is in quartzite. At the point 87 there is a close contact without ore or sign of ore. From 87 to 88 was in lime, and on this course I note the passage of several fissure-veins. From 88 to 89 was in lime; thence to 89 A, at which joint there is a winze going up to the 7th level, where there is a contact with quartzite. And at this point a drift has been run in from the winze in orey matter, which, however, does not rest upon the quartzite, but is in the limestone. This orey matter is indicated by the fissure-plane with several ore-nodules in the quartzite. The ore at that point several feet from the quartzite,

worked into the limestone. From 89 A to 89 B is in lime. At 89 B there is a close contact with the quartzite, without any vein or sign of ore, although I believe that at this point assays have been taken which show $16.00 per ton in gold. I will remark that the quartzite very frequently shows high assays in gold.

Q. Who took those assays?

A. I don't know who took them. Mr. Lundberg made the assays.

Q. The assays that were sworn to in the affidavits of the plaintiffs in this case?

A. Yes, sir; I made a memorandum here at this point
802 that they were supposed to assay $16 in gold. From 89 B to 89 D I followed on the plane of contact with the quartzite, which is closed all of the way, without a sign of ore. At 89 C there is a cross-cut to a natural cave, with a fissure-plane standing almost vertically, and which makes back to the quartzite and into cave. It is the same course also between the eighth and ninth levels. Thence we pass down this cave into the ninth level, going down from 89 F. I found ore from 89 C to 89 F.

Q. Did you examine the balance of the level from 89 F to 89 E?

A. Yes, sir.

Q. What did you find in that level from 89 F to 89 E?

A. There is no ore until you reach the end of the level, where they are now making a raise. The distance from 89 F to 89 C is 61½ feet; and that makes the beginning of the ore-body which is now being raised. When I was there they had got about 34 feet upon it. It is on the contact with the quartzite.

Q. You carefully examined the point at which the assay of $16 a ton was reported, did you?

A. Yes, sir; I examined the point first, and then taking that point, and referring it back to the map, I understood the report was that it assayed $16. The assay was made by the plaintiffs.

Q. You didn't examine that point again?

A. No, sir.

Q. Are you able to form any judgment as to the probability of any such assay having been got there, or not?

A. It would not be unlikely that an assay of that sort could be obtained in gold, but as to the ore having economical quantity at that point, I have my opinion that it has not.

803 Q. Why do you think that the assay might be got of gold?

A. Because the quartzite contains a good deal of iron pyrites; either as such or else as in a decomposed condition, and iron pyrites always contain more or less gold.

Q. Then you think that a similar assay might be got at points in the quartzite?

A. Yes, sir; in a great many points throughout the mine, without any reference whatever to the ore-body. I have no doubt that

could be obtained in a number of places. But these notes were taken with reference to the economical character of the deposit.

[Here the court takes a recess till 2 o'clock P. M.]

AFTERNOON SESSION.

Direct examination of WM. ASHBURNER—Resumed.

Mr. Wren.—Q. I had examined you in reference to what appears upon the 9th level of the Eureka and upon the 8th level at the time your examination closed this forenoon. Is there any barren portion on the level of the Eureka; and, if so, please point out to the court between what points that level is open?

A. I mentioned it in my examination, giving the various points between which it is barren, where I stated limestone without any mention of ore. That was the idea I intended to convey of it. That it was barren.

Q. What is that?

A. I stated that I mentioned in my examination the various points between which I passed, and when I stated they were
804 in limestone and in quartzite I intended to be understood they were barren, excepting where ore was mentioned. In a great many points I mentioned, particularly, that there was no ore, which was at the junction of the quartzite and the limestone generally.

Q. Does the same rule hold in relation to the 8th level of the Eureka?

A. Yes, sir.

Q. In the barren portions of the limestone shown in those workings, what is the appearance of the limestone? Is there a net-work of small veins of ore intersecting it in every direction?

A. Not at all. As a rule, the limestone in those places where it is spoken of as being barren is entirely destitute of ore. It is simply solid, compact limestone, as a rule. In places it may be sometimes fissured, but, as a rule, the limestone is solid and compact.

Q. Is it, as a rule, colored with iron, or not?

A. As a rule, it is not. It is sometimes colored bluish with organic matter, probably; in other cases it is of a greyish white.

Q. Are there any indications of ore whatever in the barren portions, except possibly here and there a small piece of irony matter?

A. None, excepting in those places where they were mentioned.

Q. What did you find on the 7th level of the Eureka?

A. The bottom at this point where the 7th level connects with the Lawton shaft is in quartzite, containing iron pyrites and quartzite, resembling a good deal in appearance and a mineralogical character, the Comstock ore. From 70 to 71 I passed in quartzite; at this point there is close contact with lime, no ore or any
805 indications of ore. From 71 to 72, is all in lime, and no ore at 72; there is a cross-cut to the right and left; in the left-

hand cross-cut there is a winze going up to the 6th level; the right-hand cross-cut follows the fissure-plane leading to the orey matter containing molybdate of lead. From 72 to 74 is all in limestone, and but little ore until we reach some stopes on that level; these stopes are then passed through to 75, where the ore-body terminates and rests on the limestone. From 75 to 76 is all in limestone, part of which is soft and part hard. There are no stopes along this distance, but it is timbered in places. At 76 there is a well-defined fissure-plane, and the limestone at this plane is a good deal fractured. From 76 to 77 I passed in lime to a close contact with quartzite. At this point there is no sign of ore. From 77 I passed on along the line of the contact to 78, without seeing any ore. At 78 there is a winze going down to the 8th level. From 78 to 79 the drift is followed along a portion of the distance, along the close contact without any sign of vein or ore. 20 feet from 78 there is some stained lime and orey matter.

Mr. Thornton.—What figures are those last?

A. Between 78 and 77, 20 feet from 78, there is some stained lime and orey matter; but there is no vein. That is as far as I went in that level. To the end of that level it has iron works which I have not seen.

Mr. Wren.—The 6th level of the Eureka Consolidated does not extend very far to the northwest of the Lawton shaft?

A. It does not extend very far from the Lawton shaft; but then there is another level corresponding to it in the Margaret ground, which is also near the 6th level; but the two are not connected.

806 Q. The 6th level connected with the Lawton shaft ends at point 60?

A. Ends at point 60, I believe. I reached this level from the level above at 65, by passing down that winze. That winze is sunk on the plane of contact. Doubtless it must seem to have been made to find ore down this winze; but on the contact in that winze there is no ore or fissure. From 60 I passed along towards the Lawton shaft, having quartzite on the right-hand side to 61, where there is a cross-cut, which passes to the left. At the junction of the level of this cross-cut there is a small body of ferruginous matter connecting with an indistinct fissure-plane. About 15 feet beyond this winze there are old stopes of ore, which are some 80 feet distant from the quartzite there, and continuing along the drift to 63, along which drift there are several fissure-veins coming into the lime. At 63 I passed out of the quartzite into lime. At first, where the drift crosses a fissure-plane comes in, and there is a small body of ferruginous matter and red lime. Also at this point there is a winze down. Then I passed along the drift to 64, it is within 40 feet of the shaft. Along all this distance the contact is generally close, but there is no evidence of ore or that the quartzite has exercised any influence on its deposition. Along this contact there is generally no evidence of ore, nor is there any evidence that the

quartzite exercised any influence upon its deposition. Wherever there are any indications of ore, there are also to be observed fissure-planes coming in from the lime.

Mr. Justice Sawyer.—These fissure-planes which you speak of as coming in through the lime, do they penetrate the quartzite?

807 A. They seem to end on the quartzite. They may penetrate it. I could not arrive at any positive conclusion in regard to that point, because the works do not penetrate the quartzite. All the works in the quartzite are entirely subordinate to those in the limestone. The ore-bodies nearly all are in the limestone.

Mr. Justice Sawyer.—In this case, could the water having the ore in solution, come up the seam along the point of contact, between the lime and quartzite, and then pass out along those fissures from the quartzite?

A. Very easily. The limestone is much softer and more easily soluble than the quartzite. In all limestone countries it is very common to find large excavations which have been dissolved out by waters containing carbonic acid. When I say very soluble, I mean in waters containing carbonic acid. So it would have been perfectly possible for the vapors to have come up along the line of contact. There are no evidences that they did; but then you have deposited there solutions in the limestone.

Q. Is it or is it not probable that those vapors or waters having the mineral in solution came up along the line of contact between the limestone and quartzite, and then passed out along these fissures, crossing from the limestone into the lime?

A. In some cases they may have done so, but as a rule I do not think they did. The limestone being much the softer rock, it was more fissured, and the vapors came up through the limestone, and the mineral rock was deposited in those caverns. It is not at all likely, though it may have come up along the plane, between the limestone and quartzite.

Mr. Justice Hillyer.—You spoke of an assay of gold found

808 in the quartzite. I ask you whether the finding of that gold in the quartzite was in that portion which was on the limestone, or not?

A. I have not entered that on my notes. I took that statement from one of the affidavits that were made in the case after I made my examination, and made an examination of it. Whether it assayed sixteen dollars or not I have no idea, excepting that the affidavit so stated, and that it came from ore near the point.

Mr. Wren.—That statement is contained in one of the plaintiff's affidavits?

A. Yes, sir.

Mr. Justice Hillyer.—You spoke of gold being found in the iron pyrites and quartzite. I was desirous of ascertaining whether that

was confined in any way to that portion of the quartzite, or whether it is diffused all through the quartzite?

A. It is found in ore all through the limestone, and some lead is found in ore all through the limestone, and a certain amount of gold in that also; but what the relative proportions of gold are in the lead-ore and in the quartzite I don't know.

Q. Is there any more gold in the quartzite near the point of junction than there is in the quartzite that is further to the southwest?

A. That I could not tell you.

Mr. Wren—Q. Have you examined the quartzite where it has been penetrated for some distance from the Lawton shaft?

A. Yes, sir.

Q. What do you find in that quartzite? Is that the quartzite that resembles the Comstock?

A. Yes, sir; I find it resembles in appearance very much the Comstock ore.

Q. Did you find any metal in it?

809 A. Oh, yes; I found metal in it.

Q. What does it assay?

A. I don't know what it assays.

Mr. Thornton.—[Interrupting.] I wish you would not state anything of that assay.

Mr. Wren.—Q. What kind of metal is it?

A. A great deal of iron pyrites, which almost always contain gold.

Q. Have you examined the quartzite, whether it has been penetrated for any distance from the Richmond shaft?

A. Yes, sir.

Q. Do you find any metal in the quartzite at a distance from the shaft?

A. There is metal in the quartzite, all the way from the shaft to the end of that drift, which I think is about 60 feet, if I recollect rightly, and the quartzite is fractured and very much impregnated with iron pyrites.

Q. Now, I understand you to say that the iron pyrites, that you find in the quartzite, should probably contain some gold, as iron pyrites almost always contain gold?

A. In all probability. I made no assay myself, but iron pyrites nearly always contain gold, and you would be very likely to find gold in these.

Mr. Wren.—Is that the point your honor desired to come at? [Mr. Justice Fielding.]

Witness.—And a good deal of the iron pyrites, on decomposing, would give rise to this ferruginous matter which is found in such large quantities, and that, on being analyzed, would also be found to contain gold.

Q. Have you examined the 5th level of the Eureka Consolidated?

810 A. Yes, sir.

Q. Give us the result of your examination.

A. From the Lawton shaft I passed to 60—I passed in lime to No. 50. On this point there is a contact with the quartzite, where there is no fissure-vein or ore. There is here a cross-cut to the left, which is in quartzite for the most of the distance, but it ends in limestone, where there is another close contact, at 51; but there is no fissure or vein. From 51 to 52 is in quartzite. At 52 is the end of the drift, where there is a raise to the 4th level. At this point there is no vein, or fissure, or ore. From the shaft to 53 is a contact with quartzite, which is an irregular course and dip. At this point there are a few timbers to support the roof, but as a rule the contact is close, without ore or vein. The quartzite here makes a cake into the limestone. From the time of the leaving of the quartzite the drift continues about 150 feet to 54. In following this drift in the quartzite I saw no ore or evidence of ore. At 55 there is a winze down to the sixth level and a raise up to the fifth. This raise is 75 feet. There are no indications of ore in this raise, but a good deal of oxide of iron and colored limestone and manganese. Efforts at this place have apparently been made by following the indications supposed to have been made by oxide of iron, to find ore. At 55 and 56 I passed along the drift, or place of contact, between the lime and the quartzite. The contact is nearly almost always a close one, without a sign of ore or vein. At 56 the contact bears east and west, and dips 55 degrees north.

Q. What is the character of the barren limestone on the 7th level? I believe I didn't ask you about that?

811 A. It is similar in character to the limestone elsewhere.

Q. To the limestone in the 8th and 7th levels?

A. Yes, sir.

Q. As you have described it?

A. Yes, sir.

Q. What is the character of the barren limestone on the 5th level, as you have described it?

A. It is the same character as elsewhere; not to be distinguished from other barren limestone in the vein.

Q. The same in compactness and appearance?

A. Yes, sir.

Q. The 4th level of the Eureka Consolidated has not been run past point 47, has it?

A. I think not. In fact, I think my notes end at 46. It may run still further than that, however.

Q. You may describe what you saw at the 5th level.

A. From the shaft to the junction on up to 40 is in lime. At the junction there is some ore matter. Thence it is in lime to the left of 41, where there is a winze rising up. The lime is hard and

of reddish color. Thence I retraced my steps to 42, where there has been a large excavation made, probably in ore, which is now filled up and caved. This ore-body is said to have extended a long way up, but I had no means of ascertaining it, because the ground is caved there. I thence passed along that level to 43, where there are ore-bodies said to have been found in contact with lime and quartzite. I was never able, however, to find any qaartzite, but a hard silicious limestone, which appeared to me to have been mistaken for quartzite. At 43 there is a contact of lime and quartzite. At this point the contact is close; no ore or fissure, but a little irony matter on the plane of contact. Thence across through
812 the limestone to 44. From 44 to 45 I passed in lime. I then came back to the 4th level, and passed in the drift to 46, which is the contact of lime and quartzite; at which, however, there is no ore-fissure or vein. I thence follow the plane of contact 151 to the end of the drift, during the whole of which distance, however, no ore was observed.

Q. The 4th level of the Eureka has not been driven for any distance into the barren zone of limestone?

A. No, sir.

Q. Did you examine the 3d level?

A. Yes, sir; on the 3d level from the shaft I followed the drift in limestone to No. 30, where there is a small ore-chamber, which, it is claimed, is at the junction of the lime and quartzite, but a careful examination at this point showed no quartzite, but simply free silicious limestone; thence I followed the drift to 31, where the quartzite is first seen. It stands there nearly vertical, and no ore to be observed, only stained limestone and a streak of ferruginous matter, which has a direction about south 80° east; thence I follow the drift to 31 A, which is 43 feet from 31; hence there is a rise which has been followed 85 feet on the quartzite; generally the contact is close, but the limestone, and sometimes the quartzite, are soft and impregnated with orey material; there is, however, no stoping on this rise; thence to 32, where the quartzite crosses the drift, the contact is close, without any ore; thence to 33. From 33 to 34 there is quartzite; thence in limestone, following that circuitous drift, to 35 or out to 34 B; no ore over this distance; thence 75 feet to the contact of lime and quartzite, which is at 35, where there is no ore-fissure or vein. I then followed along the quartzite; generally a close contact is made between the lime and quartzite to 36; no ore along this drift, though there is every evidence
813 that attempts have been made to find it; that is quite a long drift; I do not recollect how long it is; it follows on the contact of the quartzite and the lime. At this point, which is not numbered on the map, the drift caves the quartzite and passes into the lime and then returns again into the quartzite; but now it has been continued some distance farther than it was at the time I

made my first examination; when I was there last month I examined the end of that 3d level and found it in a reddish limestone.

Mr. Wren.—Do you find any ore from 36 on the 4th level of the Eureka Consolidated, to the northwest end of that level, either on the main level or in the cross-cuts?

A. There is no ore up to point 37.

Q. Is there any ore from 37 on to the northwest end?

A. No, sir; there is a bunch of excavated ore at 38.

Mr. Thornton.—Where is that?

Mr. Wren.—Away back towards the Lawton shaft.

Mr. Thornton.—That is immaterial, then.

Mr. Wren.—Q. What is the character of the barren portions of the limestone on the 4th level of the Eureka?

A. In some places it is hard and in some places soft. Where it is close to the contact it is sometimes soft, but as a rule it does not differ from the limestone found elsewhere.

Q. In the other levels which you have testified to?

A. Yes, sir.

Q. What do you find on the level 36 feet above the Lawton tunnel of the Eureka Consolidated?

A. What level is that; the second?

Q. I believe so, though I am not sure.

A. I have no notes of that.

Q. Do you recollect passing through it?

814 A. I recollect I passed through a very long body of limestone until near the Windsail shaft; that is mostly barren limestone; I do not know but what it is entirely, but I took no notes of that ground?

Q. Did you pass in at the Champion tunnel?

A. I have been through the ground. I have a note in regard to that drift that it is in limestone.

Q. This drift 36 feet above the Lawton tunnel?

A. 36 feet above the Lawton tunnel; that it is in limestone, and has been run several hundred feet in length.

Q. Through limestone?

A. Through limestone.

Q. Have you any note in relation to the Champion tunnel?

A. From 5 to 6 there is an ore-body, and thence I passed through the Champion chamber of the Richmond mine, and out to the surface at 7. I did not take any notes of that.

Q. What did you find that tunnel run through?

A. That tunnel, I think, is in limestone, but of that I won't be sure.

Q. What is the size of the ore-body you found at 6-6?

A. I have no dimensions of that ore-body.

Q. Have you any note of what you find in the tunnel running from the ore at 6-6 to R?

A. That is a drift about 100 feet long, I think, in limestone.
Q. You find a small body of ore at the point marked A?
A. Yes, sir.
Q. Some winzes pass down on it?
A. Yes, sir.
815 Q. To the Lizette level?
A. Yes, sir.
Q. Do you know of any other ore-body or stoping anywhere in the vicinity of the ore-bodies marked 6-6 and the ore-body marked A?
A. No, sir; I examined none.
Q. Did you look for any developments that could be found there?
A. Yes, sir; I followed up through these workings here, and then passed into this drift some distance on the first occasion; and then on the second occasion I went through here; and then I passed through the drift and saw no ore-body.

Mr. Wren.—Mr. Thornton, have you got a copy of your map in court?
Mr. Thornton.—No, sir. There is a copy of it on the judges' desk; that is, of that portion of it.
Mr. Wren.—I want to ask the witness one question on that map, or, I will ask him the question to-morrow morning, if you will bring your map into the court-room then.
Mr. Thornton.—There is a copy of it here. I think that the judges have a copy of it before them.
Mr. Wren.—No, sir; there is not a copy here.
Mr. Justice Field.—I think the marshal will find the copy.

Mr. Wren.—Q. Did you examine the K. K. mine?
A. Not on this occasion. I did several months ago.
Q. When you were there the first time?
A. Yes, sir.
Q. What amount of ore did you find touching the quartzite in the K. K? Did you find any such ore-stope anywhere, [pointing on copy of plaintiff's map which was here produced,] anywhere
816 in these works, between the Champion surface ore-body and the ore-body at winze A? That is, that winze is so marked, I think, on our map?
A. No, sir; I have not any recollection of it; and I have no memoranda.
Q. No recollection of any such stope as that anywhere at all in that vicinity?
A. No, sir.
Q. Between the ore-body at the surface of the Champion mine and the winze marked "winzes" on the plaintiff's map?
A. No, sir.
Q. You think it likely that there could have been any such stope as that lying between those ore-bodies, without you having found something of the kind?

A. I think not, sir.

Q. About what amount of ore do you find touching the quartzite in the K. K?

A. I am trying to see [examining]. In the K. K. mine, between the Nos. 34 and 36, I passed up a winze 30 feet in limestone; then along 20 feet further, making 50 feet in all, with the floor of the winze on the quartzite. At the top of this winze there are stopes on the quartzite, extending about 120 feet northwest; these stopes extending upwards some thirty feet, and are from 6 to 10 feet wide. At the end of the stopes and lime-stain, from 4 to 20 feet in thickness, rests on the quartzite, and the ore makes down in the limestone and in on the quartzite. The ore that rests on the quartzite in these points was noted as being peculiar, and as being composed in some measure of quartzite.

Q. Did you see a large body of quartz in the K. K. apparently bearing metals?

A. Yes, sir.

817 Q. Do you think it possible for that body of quartz to have originated from, or by depositing by waters that had flowed from the quartzite above, and percolated through to the position that the quartzite now occupies on the K. K?

A. I hardly think it likely, sir; individually, sir, I don't think it did. There is a body at or near 37 in the K. K., a quartzite body resting on and apparently surrounded by limestone. This ore-body has been chambered out. It is said to have been quite rich in gold.

Q. Did you notice any ore-bodies touching the shale in the K. K?

A. There is no shale in the K. K.

Q. It has been called shale by the plaintiffs. You say there is no shale in the K. K?

A. None that I noticed, and I believe that I examined every important point. I saw no shale in there. There is a great deal of clay there. Generally very calcareous, I think. I have spoken of it as calcareous clay, which effervesces very freely with acid.

Q. Did you find any ore resting on the clay, or against it?

A. I shall have to refer to my notes again for that [examines]. It is several months since I examined that mine [examines]. No, sir. I have no note of any ore resting on the clay.

Q. You examined the Lizette tunnel and level also, did you not?

A. Yes, sir.

Q. What did you find in those workings?

A. From the mouth of the Lizette tunnel to this point, which is marked here "ore-chamber," there is no ore that I reccollect. I passed into hard limestone within 38 feet of the beginning of

818 the stopes, sir. No. 2, which is there, is the beginning of the Rossiter incline, where the ore-body has been worked down, up in the Tip-Top. The length of the stopes on this level was 92 feet. At the southeast end of the stope I passed out of ore, which rests on hard limestone.

Q. What did you find on the Lizette level?

A. I am passing on to the Lizette now. From this point I pass on in hard barren lime, without any ore for 90 feet, when there is a small body of ore in the lime. This has been excavated out; I don't think it amounted to anything in value. This is in lime, 110 feet, to where the cross-cut has been given, which, I think, is not represented on this map, to a bunch of ore taken out, or rather it was prospected by the cross-cut for 28 feet, when it ended, or butted against the lime. Back of these bunches of ore are said to have been entirely destitute of lead or silver. The next hundred feet is generally hard limestone, without ore, though there are bunches colored with lead and also bunches or patches of ochre matter. The next 90 feet, to the end of the tunnel or the bottom of the winze leading up to the Champion, all of this distance is in hard, barren limestone.

Q. What do you find on the surface between the top of the Tip-Top incline and the ore-croppings in the Champion?

A. Following around here.

Q. [Interrupting.] No, sir; on a straight line between the two?

A. As I recollect, this is all limestone through here; very much as represented on the map; I do not recollect any ore indications there.

Q. Did you examine the Virginia or Iron shaft?

A. I don't think I did, sir.

819 Q. Do you recollect examining the shaft when we took specimens from the Champion and Lookout line?

A. Yes; I recollect at the shaft, but I examined it on that occasion only with reference to another matter.

Q. If there had been any ore-body there of any size, would you have seen it?

A. Undoubtedly I should; if there had been an ore-body there of any size. If I recollect rightly, I took some specimens from there, of limestone.

Q. Did you notice in taking specimens any iron-colored red in the road southwest of the Tip-Top incline?

A. Yes; there is a small outcropping on the road which leads from the Tip-Top shaft, about 300 feet or 350 feet from the Tip-Top shaft. It is moderately ferruginous. Most limestone, ferruginous indications from 2 to 2½ feet; I understood. Do you want the assay value of it?

Mr. Wren.—No, sir; we will prove the assay value of it. I will ask you whether you found a zone of barren limestone, sometimes quite wide and sometimes narrower, extending on the whole distance in a northeast direction, between the pipe found in the Richmond and the bodies of ore found in the Eureka Consolidated?

A. I did, sir.

Q. Did you make an examination of the quartzite and the shale to the south, on Ruby Hill, for two or three miles?

A. Yes, for some distance; I don't know how far. I found the shale crossing along very much as entered on that map, until it reached that old claim called the Jefferson tunnel, in which
820 I went, and there was a close contact there between the shale and the quartzite. I then followed the quartzite and the shale, I may say, into the top of that high hill that overlooks the back, southerly from Ruby Hill. Where the quartzite appears to give out and the shale continues on, crossing to the west of the Dunderberg.

Q. Then the shale found at the Jackson mine runs west of the Dunderberg?

A. It appears to.

Q. Cannot you tell?

A. There is no doubt of it.

Q. Can't you walk right to the end on it?

A. Yes, sir.

Q. Do you know anything about the Dunderberg mine? The quantity of ore taken out, or the value of it, except by reputation?

A. No, sir; except by reputation, by what I have heard, I could not tell. I have heard a good deal about what was taken out of it.

Q. Do you know about the mines that are found along there, immediately to the east of this belt of shale found on Ruby Hill?

A. Nothing of my knowledge.

Q. Did you see the dumps of the various mines lying just to the east of these workings, as you went to the south?

A. I saw there were dumps there, but I didn't go to them to examine them.

Q. You didn't go to the dumps in order to examine them?

A. No, sir.

Q. You are acquainted some with the Comstock?

A. I have been acquainted with it, sir, but I have not seen it very frequently within the last few years.

821 Q. Have you ever made any examination of the mines on the Comstock?

A. Yes, sir.

Q. Is there any resemblance between the Comstock mines and those on Ruby Hill?

A. Not in the slightest, sir, in my opinion.

Q. What are the points of difference between them?

A. In the Comstock vein the vein is in places a contact vein. I think it is a contact vein for several thousand feet. It rests upon an eruptive rock called diorite, which is overlayed by a volcanic rock called porphylite. It is fissured along the general course, parallel with the course of the diorite. And then these fissures are filled with quartz-carrying ore. In this vein there are large masses of country rock, foreign and intruded, which masses are called

horses. And in a great many instances this mass of rock may be found, I think, surrounded by a vein-matter. I don't say that they are so always. Very likely you will find a great many instances where they are not, but, at any rate, they have all the characteristics of horses.

Q. Are the horses all surrounded by some of the fissures of the Comstock?

A. Do you mean to say that they have vein matter on one or more sides? Is that your question?

Mr. Wren.—What I mean is this: Are they all surrounded by one or more fissures, that is, there are several fissures that are called part of the Comstock lode?

A. Yes, sir.

Q. Do you always find, in cases of horses, one of the fissures lying on one side of the horses and another one of the fissures on the other side?

A. Yes, sir, I think you do always.

822 Q. Then the horses are always surrounded by fissures of the vein?

A. I think so—as you put the question—and I think I know what you mean.

Q. Is anything of that kind found on Ruby Hill?

A. Nothing of the kind.

Q. You know something about the chimneys and bonanzas on the Comstock?

A. Yes, sir; I did at one time. I have not kept track of them now for several years.

Q. Are those chimneys usually found in ore-bodies of quartz in the earth, or not? I don't know whether it is the case or not. I ask you the question now.

A. In the Comstock vein, the filling of the fissure is quartz, which carries bodies of ore. It follows a more or less regular inclination in depth. They may run down vertically, they may be inclined. But in every case, I believe, the quartz, which as I said before, is following on the fissure—the real vein-matter extends far beyond the ore-matters themselves, to the north, and, I think, probably, to the east and west. That is, the quartz to the north and south, as is usual the boundaries of the ore-bodies or the paying rock.

Q. After you worked out an ore-body you can continue your explorations still farther in quartz, not being in vein-matter. Is not this usually found to be the case on the Comstock; that the ore is found rich enough to pay, in ore called bonanza or chimneys; and that, as you recede from the pay-rock, the quartz becomes poorer and poorer until it contains little or nothing?

A. It may; it is not absolutely necessary that it should,

823 but in a number of instances I have seen the works extend away from pay-ore into quartz. I think the old Ophir was

worked out to nothing. I think it was worked out to the country rock.

Q. There is usually no sharp line of distinction between pay-quartz and that which does not pay?

A. It may taper off very gradually from pay into poor quartz. It hears no resemblance to the ore in the mines now under consideration, where, very frequently, the ore-matter ends abruptly in barren quartzite, containing no ore whatever.

Q. How is the quartz and ore supposed to be associated together, and how are they probably deposited in the vein?

A. The fissure was probably first found, and then the quartz was brought up from the regions below in a state of solution, carrying the ore with it, and it was subsequently deposited in the position which it now occupies.

Q. The quartz and the ore, then, were derived from the same source—the quartz and metal?

A. I think, undoubtedly, they were.

Q. And deposited simultaneously?

A. Probably they were; I have every reason to suppose that they were, and I do not know of any reason to suppose that they were not.

Cross-examination of WM. ASHBURNER:

Mr. Thornton.—Q. Do those bodies of ore in the Comstock tend towards the foot wall—dipping towards the foot wall?

A. I think they do, sir.

Q. Do you know any place in the Comstock where there is country rock from wall to wall.

824 A. I don't recollect now; I have not seen the Comstock to examine it carefully for a number of years; it would not surprise me at all if, in the Best and Belcher, there was country rock from wall to wall.

Q. Don't you remember that there were several places in the Comstock where there was country rock from wall to wall?

A. I don't recollect; it may be so; I don't recollect.

Q. You say you don't think so, but that it may be so. Don't you recollect that it was so in the Best and Belcher?

A. I think possibly it might be so.

Q And you still have the impression that it was or is so?

A. I have the impression, but it is a great many years ago since I made any careful observation there; a great many years ago, I say, because time passes quickly in California; I think it was 1863; I think, then, it was, I said that there was country rock extending from wall to wall in the mining works called the Best and Belcher, but it is a mere matter of recollection; I cannot speak positively about it.

Q. You say that you went down on the Richmond works from the top of the Tip-Top incline to the bottom on the 9th level?

A. Yes, sir; not the 9th level. I said to within about 40 feet of the bottom of the 8th level.

Q. Yes, sir. That is correct. Did I understand you to say in one place, in going down, you lost ore and followed for a short distance the oxide of iron, or orey matter?

A. I lost the pay-ore.

Q. But a connection was made in this orey matter or oxide of iron, from one to the other?

825 A. Yes, sir. Following the fissure-plane—a well-defined and perfectly distinct fissure-plane, nearly as smooth as the wall of a house.

Q. Would you call that orey matter, the oxide of iron you followed there, a gangue of the vein?

A. I don't know as I should.

Q. What is the gangue of that vein?

A. The gangue of that vein is probably oxide of iron. If, in the process of working, they got out limestone enough, why the gangue of the vein might be limestone. The gangue of the vein is, as a rule, a foreign and worthless matter. Generally it is stony, but it is not necessarily stony. Sometimes it may be oxide of iron, or it may be talc-spar, or it may be sulphate of baryta. But, as a rule, that is the matter in a vein which is not worked.

Q. It is the oxide of iron in this case?

A. It is the oxide of iron in this case.

Q. Does not the oxide of iron in this often contain minerals, and is not it useful in the workings of this vein?

A. Yes, sir; undoubtedly. But it is only useful indirectly. It is only useful for the metal which it contains. If it contained any oxide of iron it might be necessary to purchase it. It is very convenient to have any connection with this ore.

Q. You say, then, it is the gangue of the vein?

A. It is a part of the vein; I will not say it is the orey gangue the vein has. It is a gangue of the vein.

Q. Then, in prospecting, wherever you strike these seams of ore or oxide of iron, you would think they were indications for a miner to look for rich ore-bodies?

826 A. I might and might not. In mining, indications are, at best, but of doubtful value. In examining indications, one person might think them very good, and other persons might think them very poor. It is a question of experience and temperament, a great deal. Now, the both of these mines, I have seen a great many indications that were, apparently, very good, which were followed, but led to nothing. But it would be impossible in the Richmond mine to strike through a body of limestone that furnish no indications, which strike directly into the body of ore.

Q. So it is impossible to say what are and what are not indications?

A. I was merely going to say that it is not a great many years since every man in Nevada had his pocket full of indications.

Q. In this barren belt of limestone, which you speak of as lying between the Richmond and Eureka Consolidated, do you think it likely at any time that a strike could be made right through the solid limestone and open into a body of ore?

A. I don't say it is likely; I simply say it is not impossible. It may or may not be the case. I hope you will find it.

Q. What did you state about it a moment ago?

A. I said, sir, that, practically, so far as developments went to show, that there was a belt of barren limestone extending between the Eureka and the Richmond ground, several hundred feet in length; that in passing through these drifts they were practically barren.

Q. The drifts were?

A. The drifts were. I think the Eureka company's people will tell you that.

Q. Well, we have had a great deal of proof from Mr. Hague and Mr. Westcoat and our witnesses on that subject. We
827 don't have to ask any of the Eureka men about it. [No, nor Mr. Hague, either. But they have testified on those points, and they put a good deal of ore in there; a great deal more than Mr. Ashburner did on them.] Now, Mr. Ashburner, that is not what I ask you. When you were making a statement about the Richmond, a few moments ago, you stated that anybody in the Richmond mine, without following or having any of these indications at all, was liable to strike through a solid piece of limestone and come upon a body of ore; did you state that?

A. Yes; I did, sir.

Q. Now, isn't the same likelihood to be applied to the body of limestone that you have called barren, that is between the Richmond ore-pipe and the Eureka bodies of ore?

A. I should think it would have been, sir, if the ground had not been pretty well prospected. They have run drifts through in a great many directions. I don't say that it is impossible. I won't even say that it is unlikely. I say that it is quite possible to strike through a mass of barren limestone into a body of ore. I brought that forward to show that it was not necessary that indications should lead to anything of value.

Q. You state it simply as a fact, as you understood the ground?

A. I state it simply as a fact.

Q. That is the way I understood it. Now, then, these levels that you have described—the 3d, 4th, 5th, 6th, 7th, 8th, and 9th of the Eureka Consolidated—are merely drifts run along, as a general thing, near the contact between the limestone and the quartzite, sometimes through the copes of quartzite and sometimes
828 in the limestone, and they do not explore entirely the immense mass of limestone that is between those pipes, do they?

A. No, sir. Although in several cases cross-cuts have been driven from these levels. There has been a great deal of prospecting done there undoubtedly, but I don't know that it has been prospected entirely.

Q. But, according to your idea of this vein, as you have just stated it, any body might go out from the 8th or 9th levels in any of those cross-cuts, and pass within two feet of any of these bodies of ore laying in the solid limestone?

A. I say that they might do it. There is nothing impossible, in the way that some of these deposits occur, for that to happen.

Q. Has it not often happened in working other mines, for instance, in working the Comstock mines, that the miners have passed directly by a body of ore and seen no indications of it, and not found it till years afterwards?

A. I believe it is; yes.

Q. And the same thing is likely to occur in what you call this barren belt?

A. It is not impossible.

Q. Well, isn't it very likely to occur, sir, from what you know of the ground?

A. Well, yes: it is very likely that you might find a body of greater or less size. For instance, this body that was recently discoverered in the Margaret ground; that is a very rich body of ore, and I am not aware that there was anything that led up to it naturally.

Q. Well, the foot wall led up to it, and the crevice on the foot wall, didn't it?

A. Yes, sir; but you followed the foot wall and the crevice so far without leading up to anything, that I should hardly regard that as an indication.

829 Q. Well, it finally led to it, though?

A. It finally led to it; yes, sir.

Q. At that place—happened to lead to it there?

A. Yes.

Q. Mr. Ashburner, you say that you would have called this a pipe-vein, except for the ridicule that has been cast upon it in the last few days, did you?

A. Well, I did not say that ridicule had been cast upon it.

Q. Well, what did you say?

A. I said that until within the last few days I should have called it a pipe-vein.

Q. Now, you have written two affidavits in the equity case upon this subject, haven't you?

A. Yes, sir.

Q. You discussed in both of those affidavits the definition of veins, and you were writing particularly with reference to these bodies of ore, what they constituted?

A. Yes, sir.

Q. Did you, in either affidavit, call them a pipe-vein, call the Richmond a pipe-vein?

A. I don't think I did.

Q. Well, when did the idea of a pipe-vein first come into your mind with reference to the Richmond body?

A. As soon as I saw it.

Q. Well, why didn't you express that in your affidavit?

A. Because in making an affidavit I never say anything more than is absolutely necessary. I didn't think it was necessary to speak of it as a pipe-vein. I simply confined myself to stating that it was a vein.

Q. Well, did you say what it was?

A. I said it was a vein.

830 Q. Didn't you use, in your second affidavit, dated the 23d day of May, 1877, with reference to it, these words: "Therefore, 'this affiant, would conclude that this body of limestone containing 'ore, was regarded as a mineral-bearing zone by the above-quoted 'author," meaning Mr. Raymond?

A. Yes.

Q. "And that it should be so regarded to-day; and that the ore-'bodies contained in said limestone should be regarded as deposits 'or veins, as may be preferred, but that the enclosing rock or the 'limestone cannot be regarded as a vein, as it possesses more or less 'of the attributes, for the following reasons," and so forth. Was that the language you used?

A. That was substantially the language.

Q. Did you state in your opinion there, whether, at that time, this should be regarded as a deposit or as a vein?

A. I used the word, if I recollect rightly, as a quotation.

Q. Yes; it is a quotation.

A. It is a quotation. I preferred to speak of it as a vein, but I think Mr. Raymond, in his report, speaks of it as a deposit, and I use it as a quotation.

Q. Well, you say then, that it should be to-day regarded—"It should be so regarded to-day." That is, as a mineral-bearing zone?

A. As a mineral-bearing zone.

Q. The body of limestone between the shale and the quartzite?

A. Exactly.

Q. "That the ore-bodies contained in said limestone should be regarded as deposits or veins?"

831 A. I make use of the word "deposit" in quoting; I prefer to speak of it as a vein.

Q. Well, you were discussing then the various kinds of veins in this affidavit, were you not?

A. No.

Q. Giving the definitions of veins from authors?

A. I was giving the definitions of veins from authors, in order to show that this belt of limestone could not be called a vein.

Q. Then, while you were so specifically describing these things, if you thought this was a pipe-vein, why didn't you give it as your name for it?

A. Because there was no occasion to do so, sir. I merely wished to show that the limestone was not a vein, and that the ore-body was a vein. Now, then, if anyone chooses to state what class of veins it belongs to, why, I may or may not differ with them.

Q. Now, has the term "pipe-vein" any—is it a general term used by any of the authorities to designate a kind of variety of ore-bearing deposit or vein?

A. It is used, I believe, very generally by writers on mining matters, to designate a peculiar shape of deposit that has more or less a tubular shape, and resembling as such a pipe. It is not necessary that a section of it should be cylindrical, but that it should be longer and narrower and thinner than—that is to say, deeper and thinner than ordinary ore-deposits which approach a more lenticular shape. That is to say, they are very long, very deep, and comparatively thin.

Q. Does it then derive its name simply from the form of it, or does its name, as it is named, derive it from the formation?

A. I regard it derives its name entirely from the shape of it—from the shape.

832 Q. How do authors so regard it who have written upon the subject?

A. I can't state positively, sir, but that has been my impression.

Q. Did you ever see any other pipe-vein than this?

A. I don't know that I ever have, sir. No, I don't think I ever have.

Q. Did you ever read of any other pipe-vein?

A. Yes, sir.

Q. Where?

A. I have read accounts of pipe-veins in the lead deposits in the north of England; there principally.

Q. Well, in what books have you read about it?

A. There is a book on lead deposits by Mr. Wallace. A book that is evidence here. I have examined those sections.

Q. Mr. Wallace in his book treats of these pipe-veins, does he?

A. He treats of lead deposits of the north of England, sir.

Q. Well, are they called pipe-veins?

A. I believe they are. They are called pipe-veins; some of them are.

Q. Well, we have been looking with a great deal of anxiety in his book here, Mr. Ashburner, for his description. I wish you would show it to us; we are very anxious to find it. [Hands witness a book.]

A. I don't know as I can show you any description where he speaks of them particularly as pipe-veins, but I can show you a drawing which illustrates the form of deposit. [Finding place in

book]—There, sir. Now, that is very much according to my idea of the way in which the ore is deposited in the Richmond.

Q. Figure 2 on what page?

A. Opposite page 116.

833 Q. Now, doesn't that represent what is called a rake-vein?

A. It may or it may not, sir. It represents simply the way and the shape of the ore-body.

Q. Well, what is that called by authors who have written upon the subject—a rake-vein, or not?

A. I don't know, sir, whether that would represent a section of a rake-vein or not. A rake-vein passes through the stratification, and resembles what is called a true fissure-vein, which will cut through the stratification and the formation, and resembles a fissure-voin much more than the ordinaey pipe-veins do. But there is no reason why the ore should not be deposited in the same manner. It is the shape, I tell you, of the ore-deposit.

Q. Solely?

A. That is the way I regard it. It is the shape of the ore-deposit.

Q. So you say this may be either a rake-vein or a pipe-vein;

A. I say that it may be a pipe-vein; I don't say that it is not a section of a rake-vein.

Q. Do you know what name the author gives it?

A. I don't recollect now, sir.

Q. Is there any description of a pipe-vein by that name in that book?

A. That I could not tell you.

Q. Well, now, can you state whether pipe-veins are ever found without being in connection with or in subordination to some other vein?

A. That I could not tell you. They might or they might not be, sir; but I could not tell you positively whether they are.

Q. Well, they may or may not. It is a matter of fact we are enquiring about now.

834 A. Well, sir, then it is a matter of fact about which I can't give you any information.

Q. Can you state, then, as a matter of fact, whether any author describes a pipe-vein as separate from all connection with some other kinds of veins?

A. No, sir; I cannot.

Q. You don't know. Do you know the definition that any author gives of a pipe-vein?

A. I don't recall now, at just this moment.

Q. Mr. Ashburner, as I can't get there, and you have easier access, I would ask you what you would call in that plate [showing a book with a map in it to the witness] the purple and the red, running down in that direction; what kind of a vein would you call that—a pipe-vein?

Q. It might or might not be, sir. Probably, if I knew German,

I could tell more about it; but I don't know German. It seems to be a section of a mine.

Q. We are not talking about what the author calls it in his writings. What do you call it? Don't that look like a pipe-vein in form, and very much like this in form?

A. Well, I could not say positively whether it was or not. I should like to be able to read it distinctly.

Q. But I was asking your own description; if that does not represent a vein?

A. A portion of it certainly does.

Q. Cuts down in the earth just as you have described the Richmond?

A. A portion of it does, but I should not be willing to commit myself on seeing a map. The description there may not tally with the drawings.

Q. Well, you recognized the other one in Wallace from a plate, without anything else to aid you.

835 A. I simply submitted that as showing a deposit of ore arranged in a certain shape, which I would think would correspond to a pipe-vein, or what is commonly called a pipe-vein.

Mr. Thornton.—We want, if the court please—and this will be the quickest way—we want to prove some facts that are material, and I will read a few sentences to Mr. Ashburner.

Q. [Reading to witness]: "This affiant also believes that similar strata, alternating in the same manner, are to be found at long distances, both to the east and west of Ruby Hill. All of these strata are of submarine origin, and were, subsequently to their deposition, uplifted by great internal forces to their present high elevation. This process of uplifting produced a great metamorphism of the rocks, and formed in the limestone, which has been particularly examined, a large number of fissures, or cracks, which appear to have a general northwesterly and southeasterly direction. Some of these fissures extend downward to unknown depths, and many of them cross the limestone to the quartzite, upon which it rests. In this belt of limestone are to be observed in many places excavations, or natural caves, some of which are filled, or partially filled, with ore; others are empty. All of these caves have every indication of having been formed by the solvent action of water, charged with free carbonic acid, upon carbonate of lime. This affiant examined very many of these caves, and they all, or nearly all, gave evidence of being connected by fissures with the regions below and through them. This affiant would also state, that the ores found in the Richmond and Eureka Consolidated mines consist principally of carbonate of lead, galena, and ozide of iron, associated with silver and gold.

836 "That this ore is found irregularly distributed throughout the limestone in bunches of from a few pounds in weight to

large masses containing many thousand tons, and that the limestone, even where immediately adjoining these deposits of ore, is entirely or practically non-metalliferous. * * * This affiant would state furthermore, that he examined all the other known bodies of ore in the Richmond mine, which are, however, of less magnitude than those heretofore mentioned, and in every case repeated tests convinced him that these bodies were inclosed in limestone." Now, can you name those other bodies of ore in the Richmond mine that were not connected with the ore-bodies described, in going down in the workings you referred to?

A. I can hardly do that, sir, unless I take some little time to go through my notes.

Q. I will not ask you to do that, then, before the court, Mr. Ashburner.

A. I mentioned one here in the Lizette tunnel, in my examination-in-chief, where ore had been worked out for some 28 feet; then that in the Lizette level, and I believe there is another in the Lizette tunnel. Then in the lower works there have been some prospecting done on small, isolated bodies of ore. So far as the developments go, I saw no connection between those bodies of ore and the main Richmond bodies.

Q. Now, Mr. Ashburner, you stated that the uplifting of these deep-seated masses of rock from below caused great cracks and fissures in this belt of limestone. Now, how did they cause those cracks and fissures? Describe the process.

A. These deposits were originally laid down beneath the bed of the ocean horizontally; the quartzite first, the limestone on
837 the top, then the shale. The shale, probably, was derived from the disintegration of the rocks, and was deposited in comparatively shallow water; so that there is every reason to suppose that has occurred already, and that it would not be found as continuous or to as great an extent as the limestone. These bodies were subsequently uplifted. I believe the geologists say that there have been several periods of uplifting. I do not know but five. During this process there was a considerable fissuring of both the quartzite and the limestone. Then, I conceive that the fissuring of the limestone, which probably occurred according to the line of least resistance to that body, gave access to the vapors.

Q. Well, I am not going to the vapors; I just want you to describe how these cracks occurred.

A. They occurred, sir, in the process of uplifting.

Q. Then there was great motion in this belt of limestone to cause these cracks, wasn't there?

A. There was a motion of a certain number of feet, sir.

Q. A certain kind of motion?

Q. Now, these capes, when they were originally deposited, they were pretty nearly level; the quartzite was nearly level, and the limestone right upon it?

A. Yes, sir; in all probability.

Q. Went right upon the other. Then, right in the process of uplifting, did not these capes of quartzite crush out into the mass of limestone which was overhanging?

A. Well, we can't tell that, sir.

Q. How was that?

A. Well the quartzite may have been deposited—was deposited, undoubtedly, first; it was in the state of soft sand. That might have been dissolved and washed away, so that the outline
838 was quite irregular; and it may have been filled with cavities in which the limestone was subsequently deposited, and on which, so that you see that there has been a great force which has driven those capes into the limestone. I don't think there is anything to prove it positively. It is a matter of speculation.

Q. Well, do you believe that was the case?

A. I don't know. No, I don't think there was; but it is something I don't know anything about.

Q. You can't state in relation to that?

A. No.

Q. You say you found in the Richmond, up and down here at various places, planes or smooth surfaces with striated faces?

A. Yes.

Q. Now, there must have been some great motion of the limestone up and down on those walls, wasn't there?

A. There may have been a motion covering a considerable distance in feet, or there may have been a very slow motion, accompanied with very great pressure. A San Francisco earthquake, under proper conditions, would produce a very great effect, which might appear to have been very much greater than it really was.

Q. Well, from those walls in the Richmond, do you suppose the limestone worked up and down from some internal force?

A. Yes, sir; I think that there was a more or less sliding motion on some of those fissure-planes, on occasion.

Q. Now, the limestone underneath of the Richmond ore-body, and the limestone above, were worked in that way, were they not?

839 A. They could work in that way, because they are fissured.

Q. Well, do you think they did work in that way to make those smooth surfaces?

A. I think there was a fracture between the two faces of limestone, and that one very probably slid on the other.

Q. One of them moved, then, whether the other did or not?

A. One of them moved, whether the other did or not; most likely they both did.

Q. You think most likely they both moved?

A. I think likely they did.

Q. Now, there are immense cavities or caverns there that are filled with ore?

A. Yes, sir.

Q. Up and down in that place, and then again narrow spaces such as you described just now, where you could barely find a tracing along the fissure of the oxide of iron?

A. Yes, sir.

Q. Now, then, do you suppose that in this motion one would move up and the other down, so that after there had been some erosion in places, the faces were brought together again and made a narrow seam between the two faces of limestone?

A. There might have been. It might have been filled with ore at one time, and then the pieces brought together and the ore completely crushed out. There is nothing impossible in that.

Q. Well, was there any lateral motion in that limestone?

A. I think there has been a slight lateral motion, because in places I observed lines of striation horizontally.

840 Q. What?

A. Horizontal lines of striation.

Q. Therefore you think the limestone has been in motion laterally?

A. It may have been in motion; I think very likely it has been in motion laterally.

Q. That is your opinion from having found those marks of striation horizontally?

A. Yes, sir; but then, as I said before, a very little lateral motion would create a very great effect, or it might not?

Q. A very little lateral motion, then, would produce these horizontal marks of striation that you referred to?

A. Yes; it is impossible to say, from the lines of striation that you observe on a rock, how great the motion has been.

Q. Well, you know the motion has been enough to make the line?

A. Yes, sir; you know the motion has been enough to make the line; but that is all you do know about it. You don't know anything about the time or the distance over which the rock may have been obliged to move in order to create that effect.

Q. Mr. Ashburner, you say you walked along from the ore-chamber through which the Lizette tunnel passes to the bottom of the winzes——

A. Leading up to the Champion?

Q. Leading up to the Champion.

A. Yes, sir.

Q. In coming along there you say you found a body of ore; at what point, or ore at what point?

A. I don't think, sir, it is marked on that map; but I can tell you. [Looks at the memorandum-book.] There is no ore for 90 feet.

841 Q. From the ore-chamber?

A. From the ore chamber, where there is a small body of ore in lime. Thence 110 feet to a cross-cut which was begun on a bunch of ore. That makes 200 feet.

Q. Just give them separately, from place to place, as you have got them.

A. Both these bunches of ore are said to be entirely destitute of lead and silver; probably irony matter——

Q. You needn't state that. That lengthens the examination to go into that. I am entirely upon other matters.

A. Very good, sir. That is all, then.

Q. Then, after you found that second body of ore which you have mentioned, how was the level to the bottom of the winze?

A. The next hundred feet generally hard limestone, with here and there places colored red by oxide of iron; also, bunches or patches of orey matter.

Q. That to the winze?

A. No, sir.

Q. The next hundred feet?

A. That is the next hundred feet.

Q. Then go on.

A. The next 90 feet to the end of the tunnel and bottom of winze leading up to Champion; all this distance is in hard limestone.

Q. That is all; the last 90 feet. Now, then, you went up a winze there?

A. Yes, sir.

Q. To what height was the entire winze?

A. I passed up this Champion winze through the limestone for 29 feet, before reaching any ore.

842 Q. Well now, then, how is it from that to the top of the winze?

A. At this point [showing] my notes are pretty badly mixed up.

Q. Well, as you went up 29 feet without finding any ore, from 29 to the top of that winze, was there ore?

A. I can't say positively, sir. My notes are too confused here, sir, to be anything that I should like to rely upon positively. There is ore some distance up here [pointing on map], if that is what you wish to prove.

Q. Yes.

A. There is ore up there, sir.

Q. There is ore in the winze?

A. There is ore up in the winze.

Q. At the bottom of the winze, what is there?

A. Well, that is scarcely ascertained. I am not sure that I have got these correct. [Referring to book.]

Q. Well, now, from the top of those winzes at the point of ore, did you pass to the point marked 5 on Exhibit 1 in a drift?

A. Yes, sir.

Q. Well, what did you find in that drift?

A. I passed through limestone.

Q. And any ore in that drift?

A. I think not, sir; I have got it marked limestone.

Q. Well, who did you pass through that drift with, looking for ore and so forth; with Mr. Hague?

A. I don't recollect who I did pass through with.

Q. With Mr. Westcoat?

A. I can't recollect, sir. That was several months ago, now. That was in March that I passed through that winze?

Q. You saw the limestone, without ore?

A. Without ore, to point 5.

843 Q. Then from 5 to the top of the winze, what was in there?

A. An ore-body, sir; winze about 75 feet long.

Q. An ore-body?

A. Yes, sir.

Q. Now, then, did you ascend that winze to the Champion tunnel?

A. Yes, sir.

Q. What is that winze in upon, to the Champion tunnel?

A. That winze, I think, passes up through ore about 75 feet to the level of the Champion chamber of the Richmond mine.

Q. To the level of the Champion chamber of the Richmond mine?

A. Yes, sir.

Q. Well, now, is that Champion chamber marked on there?

A. It is marked ore, I think.

Q. Ain't that ore-body at the bottom of the winze you have just described?

A. I don't think it is, sir. I am certain my notes don't show it. I don't think it is.

Q. Well, didn't you tell me that from 5 to 6 on the level, where you came round from the top of the winze at 4, was an ore-body or ore-chamber?

A. I came through this drift, sir.

Q. Well, to an ore-chamber?

A. To an ore-chamber.

Q. Now, then, you came up the Shaw winze to the level of the Champion tunnel, and so you found another ore-chamber, didn't you?

A. There is an ore-chamber in this winze, sir, but I cannot state positively with regard to the number of feet.

844 Q. Never mind the precise size. This is a very important point in the testimony; one of the most so in the case.

A. With some assistance I might get this thing straightened up so as to answer your purpose.

Q. I want you to be perfectly candid. I will give you every opportunity, but you just described two ore-chambers, and you read them from your notes, and I wish you would read them again, so that we can see. Now, in coming along at the top of the winze at the figure 4 to the figure 5, you came along a drift in limestone, you say?

A. Along a drift in limestone.

Q. Now, then, at the point 5, did you find on the level of that drift an ore-chamber?

A. From 5 to 6, sir?

Q. Is an ore-chamber?

A. Is an ore-chamber.

Q. On the level of that drift?

A. Yes, sir.

Q. Then, didn't you raise up a winze to the level of the Champion tunnel?

A. Yes, sir.

Q. Well, at the level of the Champion tunnel, at the top of that winze, didn't you find an ore-chamber?

A. That is about 75 feet long, sir. My notes have it.

Q. That winze?

A. That winze; and I speak of it as passing through an ore-body about 75 feet to the level of the Champion chamber of the Richmond mine.

Q. Then, when it got up to the level of the Champion tunnel, did you find an ore-chamber there at the top of that winze?

845 A. Well, in all probability I did; but it is three months ago since I saw it and I cannot speak from recollection. I have got to rely on my notes, and at that point my notes were a little confused.

Q. Is it your impression from the notes you have got that you found an ore-chamber up there?

A. Well, I read you all the notes that there is, that I passed from 5 to 6 through an ore-body about 75 feet to the level of the Champion chamber of the Richmond mine. Now, of the extent of that body I can give no idea.

Q. Did you pass then along the Champion tunnel out to the surface from the top of that winze?

A. Where is No. 7, sir?

Q. There is 6 [showing].

A. Now, I passed out of these [showing] to No. 7.

Q. No. 7?

A. Yes.

Q. In that tunnel as it is there put down on that map?

A I think, in all probability, I did, sir; but I can't say positively. I believe this map is accurate.

Q. How many times did you ever pass through there, Mr. Ashburner?

A. I passed through there once, sir, taking notes, and then once again without taking any notes.

Q. Well, did you pass along the Champion tunnel both times, as it is here marked down?

A. That I could not tell you.

Q. You cannot state that?

A. No. No; I could not state positively with regard to that.

Q. [Showing another map.] Now, then, can you state whether this map is truthful and correct in showing that there are
846 two branches of the Champion tunnel going up to the surface from the top of that winze—one coming out as Mr. Westcoat has drawn it, in that direction, which would be from 6 to 7, and one coming around in that direction [showing]?

A. I could not tell you with regard to that.

Q. Well, then, if you never went into that tunnel, you cannot tell whether it passed through the ore-body there?

A. Probably not. If I have not been it in, I could not tell.

Q. You say you can't tell from your notes whether there was an ore-body or ore-chamber from which ore had been taken generally from the top of that winze, which is at the end of the Champion tunnel?

A. My notes say, sir, that I passed up a winze 75 feet through ore. That is all I can say with regard to it. I can't recollect. It is a matter that I didn't know the bearing of at the time I examined it. I merely confined myself to taking the notes of it.

Q. I understood you to be directly contradicting Mr. Read upon the existence of these bodies here, and I wanted to see how accurate your knowledge was of that, because he has sworn positively to putting that there [indicating] from actual survey.

A. I did not know Mr. Read's testimony. I merely said, if I recollect rightly, that I didn't know of the existence of those ore-bodies there, and there was nothing in that map that I recollect having seen; wasn't that the substance of it?

Q. Do you mean to say whether or not those ore-bodies exist at those places, Mr. Ashburner; because that is a very vital point and a thing I do not wish to have any mistake about?

847 A. I think if they had existed I should have seen them, sir; and my notes would have been fuller unless the ground had been all caved.

Q. Unless the ground had been caved; so you didn't see them——

A. So I could not see them. I think I should have examined.

Q. But you are uncertain as to which arm of the tunnel you came out to the surface?

A. I am uncertain.

Q. And you are uncertain in your notes at several points in that immediate locality?

A. Yes, sir.

Q. Mr. Ashburner, you testified about the end of the 3d level of the K. K. being, at the time you last examined it, in reddish limestone.

A. Yes, sir.

Q. When was it that you last examined the end of the K. K.?

A. Of the K. K.?

Q. Of the Eureka, I mean.

A. The Eureka?
Q. Of the Eureka Consolidated?
A. July 23d, sir.
Q. July 23d, last?
A. Yes, sir.
Q. Well, did you see then, in the end of that tunnel, orey matter or iron stains—oxide of iron stains?
A. Yes, sir.
Q. Which you have already testified is in some cases an indication of approaching ore?
A. Yes, sir; though it may or may not be.
Q. Well, in some cases? I qualified the question.
A. Yes.
Q. You have stated that in some instances you applied the acid?
848 A. Yes, sir.
Q. Along that quartzite? How did you find that what was claimed to be quartzite was really silicious limestone?
A. By applying the acid, sir.
Q. Never by any analysis?
A. Never by any analysis. If it had been highly-magnesian limestone the hydrochloric acid would have dissolved it with heat; but in the case where I spoke of being not magnesian limestone, or rather the highly-silicious limestone, there was an effervescence.
Q. I ask you about the quartzite. How did you find what was claimed to be quartzite was really silicious limestone?
A. Because it effervesced.
Q. Is there such a thing as calcareous quartzite?
A. Oh, well, calcareous quartzite, or silicious limestone, sir; I never heard of the term calcareous quartzite.
Q. Well, is there such a thing?
A. I could not say positively whether there is or not. It would depend a good deal upon taste, whether you use that term or not. I think I should speak of the rock that perhaps you would call calcalcareous quartzite, I should probably speak of it as a silicious limestone.
Q. Would not acid act on calcareous quartzite?
A. It would depend very much upon the amount of quartz that there was in the so-called calcareous quartzite. If there was enough quartz to make it insoluble, then it would not act.
Q. One thing, by the way, did you testify as to tracings from the 5th level ore-body to the 9th level ore-body?
A. I believe not, sir.
849 Q. You have not testified in reference to that. Did you go down there?
A. Yes, sir.
Q. Well, unless you have testified for Mr. Wren on that point, I do not care to pursue the matter.

Mr. Wren.—I intended to have examined on that, but owing to the way his notes were made I omitted to do so.

The Witness.—Well, I made special notes with regard to that point, sir.

Re-direct examination:

Mr. Wren.—Q. You have examined the winze from the cave from the eighth to the ninth level of the Eureka up to the eighth level, have you?

A Up to the 5th, I told you.

Q. I want to take you through each winze separately.

A. Suppose I begin down here to go down?

Q. I have no objection, if your notes are written in that way.

A. My notes were written in that way.

Justice Field.—Will the examination take any length of time?

Mr. Wren.—I am going to examine him as to a matter that by accident I failed to examine him on, simply as to one point, and it is a very important point in the case, and it occurred simply because his notes were written up separately, and he asked me in effect not to examine him on that point until he had closed on his notes on the other point. It was in relation to this connection up here.

The Witness.—In following this connection [showing] I be-
850 gan at point 58, and passed down to point 59 in ore; thence from 59 to the winze at 69 without ore; thence down; thence along that level.

Q. What level?

A. That level from 69, bottom of winze 69 D, to 69 F in ore; thence down the winze to 79 G; thence to 79 F; thence to 79 C, all in ore; from 79 C to 79 A there is no ore; thence down the winze to the eighth level, and along the eighth level to the top of the winze leading down to the cave, and down that winze into the cave. This I will say is along the contact of the quartzite, but without ore, and from there to the point 90, which is in ore on the 9th level of the Eureka.

Q. For what distance through those winzes did you find an absence of ore?

A. Well, sir, I should say there was something over 200 feet—between 200 and 300 feet.

Q. That there is no ore?

A. That there is no ore.

Q. Did you examine those points carefully?

A. Very carefully indeed, sir; I went over them twice.

Q. In what direction does the ore pitch or dip that is found at the 5th level of the Eureka Consolidated, and below that to the 6th level and 7th?

A. That I could not tell you, sir. I think I have no notes on that point.

Q. You were asked, Mr. Ashburner, if all of these ore-bodies didn't tend toward the quartzite.

A. Was I asked that question?

Q. I believe you were.

Mr. Thornton.—I don't remember of asking it.

Mr. Wren.—No; you were asked if the ore-bodies in the Comstock did not tend toward the syenite.

A. Toward the foot wall.

851 Q. How is it with the ore-bodies in the Richmond and Eureka; do they tend toward the foot wall or not, or does that depend upon the point at which you begin on the ore-bodies?

A. Well, I have been unable to see that the foot wall exercised any influence on the deposit of the ore-bodies in the Richmond or the Eureka. All of this large ore-body in the Richmond is in limestone. It is surrounded by limestone; the quartzite is not near it; so to say, whether they tend toward the quartzite or not; a great many fissures seem to end in the quartzite; they may penetrate the quartzite. If the workings were carried on in the quartzite, and where they follow the fissure, and where the fissure ends in the quartzite, it is very likely that the ore-body tends toward the quartzite.

Q. In your judgment, or rather from the facts that you have observed along the line of the quartite, do you think that the quartzite and limestone have moved upon each other?

A. I do not think that they have, sir, to any great extent; but in many places the contact was so clear and the ground so soft, that it would be difficult to say whether they had moved or not; but in most of the places—in fact every place, I think—where I noted a contact between the lime and the quartzite, where that contact was close, I so noted it, and then there was no evidence of there having been any movement of one upon the other.

852 EIGHTH DAY—CONTINUED.

Re-direct examination of WM. ASHBURNER—Continued.

Q. If there had been any fissuring at the point of contact between quartzite and the limestone, and any movement of the quartzite and limestone upon each other, with the regularities existing along the line of contact, would it not necessarily have opened up wide chambers between the limestone and the quartzite?

A. If there had been any movement it is probable that there would have been a deposit of clay there, to a considerable extent, resulting from the disintegration of the rocks, but there was nothing of that sort observed. In fact, in places it appeared that the limestone merged into the quartzite, and probably gave rise to what might be called calcareous quartzite.

Q. That paper, torn in that way [showing], presents a fair idea of the inequalities that exist in the line of contact between the limestone and quartzite, does it not?

A. Well, the inequalities are quite as great as that represented on that scale.

Q. Both upon the dip and longitudinally?

A. Yes.

Q. Now, if there had been any movement of the quartzite and limestone upon each other, if the one had slid up or the other down, it would have brought the more prominent points opposite each other, so as to have opened chambers in the——

A. [Interrupting]—Undoubtedly; it would, sir.

Q. Then, taking the inequalities between the contact of the limestone and quartzite into consideration, and the absence of
853 any such chambers along that line, what would you conclude as to the two rocks having slid upon each other?

A. I do not think that they slid upon each other, sir.

Q. Are there any evidences at Ruby Hill by which you can determine whether the limestone immediately overhanging the quartzite has been laid down conformably with the quartzite, or not?

A. No, sir. I did not look into that particularly; I did not examine it.

Q. Sometimes rocks of sedimentary origin are found that have evidently been laid down non-conformably?

A. Yes, sir; very frequently.

Q. It is evident that the lower series was first laid down, and then tilted up slightly, and subsequently other strata were laid down upon the tilted strata, which resulted in non-conformability of stratification?

A. Of stratification; yes, sir.

Q. There are no evidences on Ruby Hill by which you can determine whether that was the case or not?

A. No. I should say it was not the case. I should say that the quartzite was laid down first and the limestone on top of it.

Q. Do you see there any evidences in the workings of those mines that would indicate that the limestone has been crushed and broken up between the quartzite and the so-called clay seam, and portions of it crowded up towards the surface?

A. No, sir.

Q. No evidences of anything of that kind?

A. No evidences of that.

Q. Are there any evidences to the contrary?

854 A. I think there are, sir. If any such action to speak of had taken place, the limestone would have been very much shattered, whereas it is not shattered; it is in the Richmond mine, and in both mines, in fact, solid and compact; you could make a quarry there and get out limestone for architectural purposes; it is like any other limestone.

Q. Do limestones usually contain a percentage of iron?

A. They very frequently do.

Justice Field.—Are you not going now beyond what you omitted in the direct examination.

Mr. Wren.—Oh, I have been off some time. I only examined him for a moment or two on a matter that I omitted, and I have been cross-examining now entirely on matters brought out by Colonel Thornton in his cross-examination, or re-examining him, rather. All of these matters were brought out by Colonel Thornton's cross-examination.

The Witness.—I believe you asked me if limestone ——

Mr. Wren.—If limestone and the other rocks didn't usually contain a percentage of iron?

A. They almost always do, sir. Iron is a very generally distributed metal. You find limestone, of course, perfectly pure, but it is the exception.

Q. Wherever the iron oxidized, oxidizing influences were exerted upon it, it would show the discoloration from the oxidized iron?

A. It would.

Q. How is it with the quartzite as well as the limestone on Ruby Hill or in that vicinity?

A. The quartzite seems to be impregnated with iron pyrites, which, on oxidizing, gives it the red color that you always see whenever you meet the quartzite.

855 Q. Is it or is not very much stained with oxide of iron?

A. It is very much stained with oxide of iron. I think the quartzite, wherever you meet it, is of a deep red.

Re-cross examination:

By Mr. Thornton.—Q. Mr. Ashburner, the point that Mr. Wren examined you in chief upon, which I did not cross-examine you upon, was as to the tracing from the 5th level ore-body down to the 9th level ore-body, for the first 200 feet or thereabouts from the 5th ore-body, down to the 7th level. You found good ore all the way, didn't you?

A. With the exception of a certain distance between 59, a space of about 30 feet; with the exception of that, down to the 7th level, there was good ore all the way.

Q. Well, did you see enough there to convince you that the fifth level ore-body, though not exactly in the tracings you took—does it actually extend and positively extend down to the 7th level?

A. Yes, sir.

Q. What is your opinion on that?

A. I think it does, sir.

Q. Now, going from the 7th level down to the 9th is where you found the 200 feet without ore?

A. Yes, sir.

Q. What is your opinion on that?

A. I think it does, sir.

Q. Now, going from the 7th level down to the 9th, is where you found the 200 feet without ore?

A. Yes, sir.

Q. And when you say 200 feet without ore, you mean without pay-ore.

A. Without pay-ore, very decidedly, sir.

Q. But with iron stains and orey matter?

A. Yes; it was along the contact, and where there is a contact there is always more or less iron stains.

856 Q. And occasionally didn't you see bunches of ore, low-grade ore down there, in that 200 feet, at different places along?

A. I do not think I did. In the winze going down to the cave below the 8th level there is a small bunch of irony matter, but with that exception I think there are no bunches. There are certainly no bunches that I noted on the way.

Q. You say that, when you spoke of ore in all your examination throughout, or did I understand you so to say; you mean in an economical view, pay-ore?

A. Yes. I mean that, in the general sense. Of course I could not tell what particles of oxide of iron might assay. I spoke of it in an economical sense.

Q. You meant, when you said there was no ore at a certain place or along a certain drift or level, that there was no pay-ore there?

A. I do not mean to say you might not go in and excavate ore, and take it to the furnace and be disappointed in it. I meant to say there was no ore there that anybody in search of ore would think of working.

Re-direct examination:

Mr. Wren.—Q. Mr. Ashburner, did you mean that when you spoke of all those barren places in the limestone on these levels?

A. Not at all, sir. No. When I spoke of going through the limestone where it is barren, I spoke of it as barren limestene. Where there are traces of ore, I think I noted them always—where there are traces of oxide of iron.

Q. Whenever there has been traces of ore or oxide of iron, you have noted it?

A. I think I have in every case; I have intended to, sir.

Q. And elsewhere the rock is entirely barren there?

857 A. Or elsewhere, in my opinion, the rock was entirely barren of either.

Q. Now, in going down the winze from the 7th level towards the 9th, do you recollect seeing any bunches of ore at all, in your examinations, either poor ore or any other kind of ore?

A. No, sir; I do not; excepting this bunch of irony matter that

I spoke of, which was small and insignificant, in the winze going down to the cave.

Q. Aside from that you saw no ore at all?

A. Aside from that——

Q. Of any kind?

A. Aside from that—except some irony matter along the plane of contact with the quartzite.

Q. What do you mean by irony matter along the plane of contact?

A. I mean to say, that whatever it might assay, that it certainly possesses no economical value.

Q. You don't understand me. What do you mean by irony matter along the plane of contact; do you mean that there was a seam of ore?

A. I mean discoloration. What I mean, a discoloration caused by the oxide of iron.

Q. What I want to get at is whether there is a seam of oxide of iron?

A. No, sir.

Q. Lying between the quartzite and the limestone?

A. No; there is not.

Q. But simply the face of the quartzite is discolored?

A. The face of the quartzite is discolored.

Q. With oxide of iron?

A. Yes, sir. That is all, I believe.

[Here the court adjourned until to-morrow morning at half past ten o'clock.]

858 NINTH DAY.

THURSDAY, *August* 2, 1877.

CLARENCE KING, called for defendant, sworn—examined.

Mr. Wren.—Q. Mr. King, what is your profession?

A. A geologist.

Q. Where were you educated?

A. In the Sheffield Scientific School of Yale College.

Q. What official positions have you held since you commenced the practice of your profession?

A. I was for three years assistant under Professor Whitney on the state geological survey of California. In an interval of that period I was engineer-assistant of the United States government, on duty in Arizona; and since March, 1867, I have been director of the United States geological exploration of the fortieth parallel.

Q. During that time have you examined mining claims in Nevada and in this state?

A. I have.

Q. A great number of them?

A. A very large number.

Q. Have you made any examination of the Eureka Mining District?

A. I have.

Q. What are the general geological features of that district?

A. The rocks of which the Eureka district are composed consist in the first instance of a series of marine paleozoic beds which
859 were deposited conformably. They consist of alternations of quartzite, limestone, slightly-magnesian limestone, and shale, both argillaceous and calcareous. These beds, as seen from a large number of sections, are strictly parallel or conformable. Only in cases of local disturbance do they show any apparent lack of conformity. They remained as submarine deposits until the close of the carboniferous period, when they were lifted into the air, and suffered during the first two divisions of the mesozoic period a great deal of sub-aerial erosion; and at the close of the jurassic period they were crumpled into mountain folds. There is one anticlinal, and only one anticlinal, in this immediate region; that is, an anticlinal embracing the cambrian, silurian, devonian, and a portion of the carboniferous beds; and Ruby Hill, upon which are situated the two contesting mines, is in the easterly dipping of the anticlinal and in rocks which are a little below the lower horizon of the devonian. They are, therefore, in the upper silurian horizon; they are, however, near the junction. Subsequent to the uplifting of this chain or anticlinal on to the present time, this whole country has been subjected to a variety of dynamic influences, resulting in vertical folds, in diagonal fissures, and in a great amount of general crushing and crumpling. This crushing of the limestone is a more or less local phenomenon, but in a general way the whole Great Basin country shows it. There are regions of many miles in which the limestone is more or less crushed—crushed diagonally to the beds, crushed with their bedding, and crushed vertically. That crushing may or may not have any relation to the vein formation.

The period at which the fissure which contains the Richmond
860 lode was formed may not be determined. It may be at the close of the jurassic, when the first great crumpling was done, or it may have been at any of the subsequent periods up to the tertiary. The limestone is a characteristic limestone. This horizon I have examined for hundreds of miles; also in this particular locality; and had made a very large number of chemical and optical analyses, which show a predominant amount of carbonate of lime, a variable amount of the mineral dolomite (never enough in the paleozoic series to be called a dolomitic rock); a variable amount of silica; and a variable amount of iron and carbon.

Q. Have you ever examined the Richmond mine?

A. I have, repeatedly.

Q. When did you first examine that mine?

A. I cannot recollect the date exactly. I think it is four years ago this coming autumn.

Q. Just prior to the former trial between the Eureka Consolidated and the Richmond?

A. Yes.

Q. What length of time did you spend in the examination at that time?

A. I was underground a great number of times during three months.

Q. Have you examined the ground lately?

A. I have.

Q. For what length of time did you examine it?

A. I was engaged in the examination of the Richmond, Eureka, about one week, and the remainder of nine days on the surface, and a short visit in the K. K., and one in the Jackson.

Q. Describe, if you will, to the court, the exposure in the Richmond mine, and the general features of the mine and lode.

861 A. The outcrop or surface exposure of the Richmond lode occurs near the top or mouth of the Tip-Top incline, and may be traced upon the surface in a slightly northwesterly direction for several feet. Entering the mouth of the Tip-top incline, it descends, showing a little ore in the roof, for about 20 or 30 feet. Below that point the pitch of the incline is greater than the pitch of the ore, and the ore leaves it and enters the upper country rock. At two intervals, one about 40 feet and the other about 80 feet down the incline, there are openings through the foot wall limestone into the ore-body. Through that ore-body I have gone all the way down to this large cave-chamber which connects with the Lizette tunnel. This is a continuous body of ore from the top of the incline to that point.

Justice Field.—Q. You speak of a cave there?

A. Ground which has been caved. It was not a natural cave, but a mining cave, or occurring from any accident. At various points along this upper incline of ore may be seen a distinct foot wall of limestone. The outcrop is 150 or 200 feet, perhaps, from the quartzite here, and the entire body pitches downward in limestone. At the point marked "caved ground" there was a very large body of ore, containing many thousands of tons, of which forty or fifty have been extracted and smelted; and there still remains in the cave——

Q. [Interrupting.] That is the first cave?

A. This large cave here, above the Lizette tunnel. Whenever the bottom of that body of ore was exposed, only hard limestone was seen, and, as in the case with all the flattened bodies of ore,

862 the surface of limestone was very rough, not showing the smooth plane which may be seen at intervals above and below. Below the level of the Lizette tunnel, from the lower

end of this ore-body, all the way through low-grade ore—the reason that chamber is not connected is that the ore thinned out and then made again, but was of too low grade to work.

Q. This space marked here on the map "Engine Chamber," from there down to that flat chamber?

A. Yes, sir; from there down to the flat chamber in the middle of the Rossiter incline, followed in the ore material, since that was easier to run. At one or two places, however, there is a deflection of the dip angle, and you come upon the limestone bottom wall of the lode. About 40 feet down the Rossiter incline, a body of ore opened out upon the southeast side of the incline; it is not on this map, since it is not now accessible. Upon the northwest side of the incline, the low-grade ore connects with a body marked "Ore-Chamber, 10" [showing]. That body of which I speak was on that side, and then on the other. I simply mention those to show that this apparent want of continuity of the ore at this point is due to the map, and not to the ground. There is a great deal that is not worth taking out, and, consequently, there are no excavations, and a great deal that has been taken out, and was valuable; the ground is now crushed, and is inaccessible to surveyors. The Rossiter incline opened into a large and valuable body of ore, known as the "Flat Chamber," which I have gone through, and observed the limestone boundaries at various points, and a fact which corresponds with the upper stations, the upper ore-body, that in these flights the smoothness of the fissure is lost, and the rough, flat limestone is seen. From the flat chamber, or within the flat
863 chamber, at the foot of the Rossiter incline, a level curves to the east, and then to the south, and again to the east, and connects; all this distance of curvature being within the orey material, until it leaves where the boundary of the ore-chamber is marked, and there it follows out in the limstone the fissure [showing]. It comes out here, and here the fissure, parallel to this fissure, very nearly pitches off, and is followed down this winze to point 24, showing a very distinct and finally characterized lode wall, and a little ore on it. At the foot of this winze, the second level displays the trace of this lode-plane at points there not brought on here, and from 48 feet southeast of the foot of the winze, of point 24, the winze, and northwestwardly to near the forks of the level, and again in that cross-cut; it reappears again in the main level toward the shaft, and exposes there about 300 feet of lode wall at intervals; it is cut in, carrying its normal dip and strike.

Judge Sawyer.—How far in this direction does it carry it?

A. It carries it to there [showing], and there are no workings beyond that point. The vein wall—the drift deflects into the lower country wall, but the fissure is seen going on in that direction, southeastwardly from point 24. From the point 23 a winze follows this fissure downward, showing a remarkably defined plane of ore upon its surface to point marked 30 on the 3d level. The 3d level

itself shows this plane northeastwardly as far as the cave, about 80 feet, and southeastwardly from the foot of the winze, about 120 feet, making about 200 feet exposure of the lode-plane on that level. In this winze, which connects the 2d and 3d levels about 15 to 20 feet above the 3d level, the fissure which
864 the winze follows down is seen to connect and join and coalesce with another fissure which dips into the limestone over it, the two diverging downward having very nearly the same strike, but diverging in dip. I will illustrate that on the blackboard. [Goes to blackboard.] From the 2d to the 3d levels, the 2d level being here, the winze has followed down a distinct ore-bearing fissure-plane, which connected directly with the flat chamber. There is the level of the third. About 15 or 20 feet above that point another fissure deflects that way. I should have drawn it a little more like that [showing], and it would have been more proper to say that the fissure which occupies the last 15 feet of the winze has diverged from the main fissure. While I am near I will draw that. Down to the 4th level this fissure continues to diverge, and it plays a very important part in the geology of the lode. Treating first of the lower, diverging fissure, the one which diverges from the main, the third level, as I said, exposes it from the cave to point 33. It is followed down a winze from 32 to 40, and there the back or lower fissure-plane is again seen cutting across diagonally through the 4th level. Another winze has been sunk on the front fissure from about point 30 to about the point 45 upon the upper or main fissure. [Showing on blackboard.] This representing the winze on the back fissure; this representing the winze on the front fissure. [Showing on map.] As I said, these two fissures in horizontal projection are not strictly parallel. The level of the 4th, for instance, the main fissure, shows a trace like this. [Showing on blackboard.] And the back fissure which has diverged from it shows a trace like that, and when followed along the 4th level is brought almost in contact with the quartzite
865 which is here. The upper fissure has kept its normal depth and direction, has gone down entirely in limestone, and from it about the 3d, as I mentioned, has diverged this fissure which comes into contact with the quartzite. Now, on this 4th level, there makes underneath this an ore-body which comes into contact with quartzite and follows it for a short distance and connects with the Margaret body. There is no ore connection with that plane to its contact with the other fissure. There is little ore at spots in this direction, but it gives out, coming here; and the two enter the cave and are lost together; not end of the cave, but end of the ore-body which connected with the cave. This body here, which is marked "cave ground," between the 2d and 5th stations, ended upward in a vacant cave, but in passing downward this tubular mass or opening contained ore, and it is in that ore that these two fissures converge. This upper fissure is seen very clearly at this point 44. This is the

back fissure on the 4th level extending back of point 40. The other fissure extends in this direction, in a southeasterly direction from point 44, that being the main or normal lode-fissure. From point 45 a winze altogether on this upper or normal vein-plane descends to the 5th level.

Justice Field.—45? Let me see. [Looks at map.]

A. It is on the 4th level, sir. Here from 45 in this direction—it is not worked there—from 45, the upper or main lode-fissure in the horizontal plane takes this course to the southeast. The underlying fissure runs in this direction, diverging slightly from it [showing], and here communicated with the quartzite which must curve in that manner. The body of ore is here, and, as I will afterwards describe, connected up to this Margaret body. From the bot-
866 tom of this winze, which connects near point 45 with the 5th level, there was more or less ore following the vein-plane all the way. There was an ore connection and a vein connection at the same time. On the 5th level, which is this—or before that, I should have mentioned that on the 4th level, on the extreme easterly drift, the top of a small ore-chamber was cut which connects downwards with the Potts chamber; there being one connection downward here, and one connection downward there. From the 5th level to the Potts chamber is an ore connection all the way through; in fact you can go from the stopes of the Potts chamber, up through here, and connecting with that ore-chamber there.

Q. You trace the connection right straight down?

A. You trace the connection all the way down, and from the croppings to that point there, either by well-defined fissures connecting the body carrying ore on it, or by direct ore connection. Below this on the Richmond 6th—— This is misdrawn. It should be over here. Above the Richmond 6th is this body of ore which connects through here with the Potts chamber. Below the 6th the main ore-body does not continue, but the fissure continues and is shown on the 7th and 8th levels very clearly. It is shown on the 7th level from point 80 to the northeast end of that drift very clearly; having the same trend as here, and connecting upward with this [showing]. On the 8th level it is seen again there, having the same trend and extending from point 82 to the southeasterly end of the drift. There is, therefore, an ore connection; ore and ore-bearing fissure connection all the way from one point to the other. The whole of this body is in limestone. The
867 nearest that the ore comes in contact with the quartzite is at point —— I had a memorandum of the exact spot. [Refers to memorandum.] Point 60. Yes, that is it; 15 feet out from the quartzite, in the limestone, begins the ore-body near 60, and that is the nearest that this Richmond fissure touches the quartzite. The underlying and diverging spur which I before mentioned, in its trend, however, to the southward, connects with the quartzite, and up to the Marguerite body of ore.

Mr. Wren.—Q. What is that last answer?

A. I say that the diverging spur in its southeasterly connection does touch the quartzite and overlies the ore which connects upward into the Marguerite.

Judge Hillyer.—Q. What is the strike of those fissures as compared with the quartzite?

A. Oh! the Marguerite comes here and makes an abrupt angle round here; and the contact between the fissure and the cutting——

Mr. Heydenfeldt.—Please speak louder; we cannot hear.

A. The cutting between the fissure and the quartzite would be at an angle approaching a right angle; the quartzite having come in here in this direction, in northwesterly direction, turning a right angle and making a bay into the limestone, corresponding in a measure with this bay which is made at this outcrop. This is the trace of the outcrop of the limestone and quartzite; the quartzite coming here and turning a sharp angle, and in all these drifts here that right angle is reproduced downward, and the contact of this back fissure is one of the points of that bend [showing]. The general dip of the Richmond fissure is northeast, the general
868 strike to the northwest and southeast, magnetic. I say that the only point in which ore in the Richmond fissure came in contact with the quartzite was 15 feet from point 60. I should add that on the sixth level, near the point 69 B, where the fissure tends toward the quartzite, is a little ore on the contact.

Mr. Wren.—Q. In what direction does the ore-body found in the Marguerite dip?

A. It dips about north, or at about 45 degrees with the dip of the Richmond lode.

Q. Have you made any examination of the Eureka mine?

A. I have. I have gone through all the levels that are open, and one or two that are caved, and a good many of the winzes.

Q. Will you describe that generally? It is not necessary to go into so much detail in describing that.

A. Well, you want me to touch upon the old upper works here?

Q. No; I don't care about that.

A. Or the works from the Lawton shaft?

Q. The works from the Lawton shaft. By the way, before you go on to that, however, what would you call the ore-body found in the Richmond mine, speaking from a scientific stand-point?

A. I should call it a pipe-vein.

Q. Give a general description of the Eureka ground.

A. I should like, Mr. Wren, to say that three years and a half ago, on the former trial, I was asked that same question, and I then defined it as a pipe-vein, and what I decided then from the uppermost workings, and only from rather shallow exhibitions of the deposits, have been, in my opinion, substantiated, and the vein, as I look at it now, is more clearly a pipe-vein to me than it was then.

869 Q. Just describe the general workings of the Eureka ground.

A. Well, for the purpose of convenience it would be well to divide the workings of the Eureka into three groups. The old surface workings, the workings which were productive of ore and which were in the region of the Lawton shaft, and the unproductive region between that ore-bearing region and the Richmond lode. From the Lawton shaft have been run out nine distinct levels, all of which, or almost all of which, all of which, if I recollect rightly, are carried back to a point of contact with the quartzite. They intersect the limestone with an immense number of cross-cuts, and develop from level to level a series of ore-bodies which are, in nine cases out of ten, within the limestone. The region of the quartzite being remarkably barren of productive ore, or of ore, a region limited by the cave on the 5th level, limited in a northwesterly direction by the cave on the 5th level, and by the line which forms a demarcation rather than a division between the Eureka and the K. K., may be seen all the productive ore-bodies. In passing downwards they form an irregular, and perhaps partially disconnected, broken aggregation of ore-bodies, separated from each other often by limestone, always by limestone. As to their connection *inter se*, they are so small, so very complicated, that in many instances it is impossible to say whether they do or not. In general, however, there is this ore-bearing zone, circumscribed in size, descending into the earth in a northeasterly direction, rather more easterly than the fissure-vein and Richmond lode. As I say, each one of these drifts

870 in turn follows the quartzite and displays an enormous amount of barren, worthless contact between the two formations, showing none of the features which, to my mind, would lead me at all to believe it a lode, the ore being confined in enormous percentage to the limestone for some distance from it. Between this region, which, as I say, is in general circumscribed or limited on the north by the cave at the 5th, extends a barren zone of limestone, where, for reasons known only to themselves, they have followed chiefly the contact of the quartzite and the limestone. From level to level this contact is traced, cross-cuts are run into the limestone, winzes are sunk from level to level, but so far as I know, and I saw every place I could get into, the zone between the cave and the ore-body, on the Margaret, is, in these levels, entirely barren. That region is also characterized——

Justice Field [interrupting]—Which cave do you speak of?

A. It is marked here, sir, on the 5th level [showing]. There.

Judge Hillyer.—It is not marked on this map [showing].

A. No, it is through here. It is here [showing]. Here is the productive region of the Eureka as developed from the Lawton shaft, circumscribed within this zone, within this circle. From this point to here [showing] the 6th is not carried through, but the 5th 7th, 8th, and 9th levels fail to show either ore or lode. The charac-

ter of this contact between the quartize and the limestone is like the ordinary character of two rocks which have been slightly moved upon each other. The limestone and quartzite are both more or less slightly crushed. There are in places infiltrated stains of iron. I saw nothing that could be called ore through those levels. The most interesting geological feature of this region, and the
871 feature which has had its effect in determining the character of the lode, is a cape, or promontory, of the quartzite. The quartzite, instead of retaining its even plane of dip and strike in this region, bends out, forming a cape. This is most powerfully developed on the 9th level of the Eureka, where this red line shows its trace. It goes out here in a bold curve, jutting out about 200 feet and recurving as far, making a deep gutter, or bay, on the side toward the Richmond, and another in this direction.

Shall I describe anything about the workings now, or do you care to take those later?—the old workings; the winze at the back.

Q. Yes; you might describe them now you are on them.

A. The third region, which I separated for the purpose of convenience, is that embraced between the end of the Buckeye body and the end of the Champion, including a considerable body developed both above and below this yellow level, which is 36 feet above the Lawton tunnel. From the end of the Buckeye—from the southeasterly end of the Buckeye or to the northwesterly end—is a broken caved piece of ground, floored with limestone, the quartzite showing below 100 or so feet below. Through various openings not down on this map, the ground being very much crushed and caved, the connection is made through to this level and with the ore-body which connects with the winze here [showing]. From a point about here, we will say east of the letter "N" ending Champion, the ore comes into this level and makes a general connection in low-grade ore around the southerly ore-streak, as marked on this level. With the Champion ore-body, which is a superficial deposit here—I don't mean superficial in origin, but I mean at present near the present surface of the ground and
872 the winze L body, there was no connection which I was able to see at all. There may be a connection, but I was unable to see it. From the north end, the northeasterly end, the northwesterly end of the Champion ore-deposits, is a tunnel which runs through here in the limestone, connecting with a winze which makes down into a small, and, so far as I could see, isolated body of ore which connects with this long level marked 36 feet above the Lawton tunnel. So far as I could see, there was no ore connection there whatever. It seemed to be an isolated body, but from there to there [showing] is an evident ore connection, and from here, and perhaps there—say between the winze L and the Champion bodies—there may be a connection which is not at present visible; but otherwise this is very nearly a connected body from there to there, and a very extensive body; but not so far as I know, or not so far as I could see, by veins connected downward with this.

Mr. Williams.—Describe the places, please, so that the reporters can get them.

Mr. Thornton.—Not connected with the ore-bodies around the Lawton shaft?

A. Not that I could see.

Judge Field.—You connect them here [showing]?

A. Connect there. That connection I could not see. There is no development now by which you can see it. But there is an ore-body through here [showing].

Q. Did you trace it?

A. I did not trace it there. I looked for it and could not see it.

Mr. Wren.—So far as you can, Mr. King, designate the different points by some names or figures, so the reporters can get them down.

A. The region here is not numbered or lettered.

873 Q. What is your opinion in relation to the identity of the Eureka ore-bodies and the ore-body found in the Richmond?

A. It is my opinion that, both as ore-bodies and as lodes, they are not connected.

Q. They are not, and are not identical?

A. Are not identical.

Judge Sawyer.—This here with the Richmond?

A. This here with the Richmond. All between here and the Richmond is not identical.

Mr. Wren.—Can you give your reasons, Mr. King, for not regarding them as connected?

A. On my former study of this lode, these lodes, as I think them now, I came first to the conclusion that this was a pipe-lode. In examining, not so much for the purpose any points that could ever come up in contention, as for the search of ore, I made careful examination of all the openings and ends of ore-bodies and drifts, which in any way led towards the Champion, At Last, and Margaret ground. Along the end of the great caved ground here above the Lizette level, which was at that time the bottom of the mine, there were no indications which warranted us in following on in search of lode or ore. At that time, however, we were in contest for this Lookout ground, and explorations were pushed to the southeastwardly in search of ore or traces of the lode in this direction. A working not down on this map, since it is not now accessible, was carried on, carried through in the Richmond ground, care being taken to keep off the Lookout; and developed a body of ore near this point, which some one has marked 5 on the map. If you will give me that old map, please, I can show it better. [Map passed to witness.] Is this in the case?

874 Mr. Wren.—Yes; that map is on a scale of 20 feet to the inch, I believe, and the other on a scale of 40.

Witness.—Here is the body; here is the line separating the Lookout and Richmond; here is the body which was worked up into the Richmond to keep the furnaces going, and not to invade the disputed ground, and that will appear about the point 5. In examining the southeasterly end of that body and its fissures, I was led to believe, from its position and angles, that it connected upward with an incline here, and showed the continuance of the vein in that direction.

Mr. Thornton.—Q. In what direction is that, Mr. King?

A. Upward.

Q. To the Champion croppings?

A. No, not at all; up toward the mouth of what is known as the limestone incline.

Q. Where is it?

A. Here is the limestone incline. Here is the point 5 that I testified to was ore; the little chamber of ore and this went up here as you see. There is the incline, the inclination of that ore-body.

Mr. Wren.—You will have to speak louder.

A. I was telling Colonel Thornton what I testified to before.

Justice Field.—This had a tendency?

A. Yes; this [showing] pitches up and makes one probably with that [showing].

Mr. Thornton.—Q. Was there ore found in that incline [showing].

A. No; that was without ore.

Justice Field.—The Martin incline?

A. The Martin incline is the same thing. There were a little iron stains in the Martin incline at that point. Beyond that to the southeastward, I was unable to find any evidences whatever
875 of the continuance of the vein, any physical evidences whatever. But from the foot of the Richmond, beginning here in limestone, some distance overlying the quartzite, and going down from the foot, that the Champion also, at about a similar distance from the quartzite, began in limestone and went down; that the Buckeye also, about a similar distance from the quartzite, and in limestone, trended downward. I saw at once the parallelism of the geological position of those three bodies of ore—the Buckeye, the Champion, and the Richmond—in their relations to the quartzite and to the general geology of the country. And as a matter, I was asked on that trial whether I believed there was a connection between the two, that they were on this same lode; to that question of opinion I testified very emphatically that I did believe they were on the same lode, and when I returned this time to visit the ground I was strongly impressed with the same belief, and insisted upon examining every southeastwardly continuation of the Richmond fissure at every possible point at which it could be exposed.

Mr. Thornton.—Q. At this last examination?

A. At this last examination. Coming to the ground in the full belief that on the former occasion that matter of opinion which I testified to was correct. I have, however, completely changed my mind and no longer believe the two to be one and the same lode. And the reasons for that change of opinion I am now going to give: I owe it, I should give my thanks for this change of opinion to the enormous amount of work of the Eureka Company. But for that superficial development I should still retain my early opinion. But having followed these levels six or seven hundred feet through
876 the barren limestone on the contact of the lode, and finding this remarkable bay of quartzite putting out here, which, when compared with the trend——

Justice Field.—Indicate it, so that it can be taken down.

A. Well, above the quartzite, as shown on the Eureka 9th level, at points 99 B, 99 A, and 99, and when comparing the position of this promontory of quartzite with the trend—the northwest, southeast trend of the Richmond fissure, I saw at once that it would either have to go through that quartzite and come out on the other side or deflect to the eastward, in order to make any connection whatever with the bodies of ore and lode developed by the Lawton shaft. Now, there are workings from the Eureka 9th which are ample to show that it does not deflect to the east; and thanks to the careful manner in which they have laid bare the contact of the quartzite and the limestone, there is absolutely no evidence of its ever having gone through the quartzite. It must either have deflected around it, or have gone through it, in order to connect with this. There is absolutely no proof of either.

Mr. Thornton.—You mean it would have to have gone through the limestone?

A. It would have to have gone through the limestone to the quartzite, and then gone through the quartzite and connected with the ore-bodies which are on the other side of this promontory. I say that the workings of the cross-cuts from the Eureka levels show, first, that it does not deflect; second, that it does not go through. And in weighing that evidence, which is of an immense exposure, against the mere fact of parallelism of position here, I believe that the two are separate and distinct lodes. Between this point
877 of the cave on the 5th level and the Richmond, I see in the Eureka no trace of any lode whatever. I only see a trace of the lode in this ground when you reach the Margaret, and in its connection downward from the Richmond 4th.

Mr. Wren.—That connection downward to the Richmond 4th does not connect with the ore in the Richmond, does it? That is, with the main ore-pipe, I mean?

A. No, it does not. Underneath the lower Richmond fissure shown there [showing] as the back diverging spur, is the one which

makes the connection with the ore by the Margaret and comes down through here [showing].

Q. Do you regard the zone of limestone lying between the shale and the quartzite as a lode, or not?

A. I have studied that gospel of bulldozed dolomite with all the care that I can, and I see no relation between it and a lode whatever.

Q. What are your reasons for not regarding the whole mass of limestone between the quartzite and the shale as a lode?

A. In the first place, it is a barren region devoid of ore. In the second place, it shows through the wandering, aimless, small cracks that are seen in all metamorphic regions, but there is no continuous fissure which marks it as a lode.

Q. I don't think you clearly comprehend my question. I speak now, not of the limestone laying between the ore-bodies in the Eureka and the Richmond, but I speak of the whole zone of limestone lying between the quartzite and the shale.

A. Why, it is no more a lode than any body of limestone is. It has none of the features of a lode whatever. A lode must
888 have a foot wall and a hanging wall, and if it is broad, that foot wall and hanging must connect at both ends, and they must connect downward. There is no hanging wall and there is no foot wall; the limestone rests as a matter of stratographical fact on underlying quartzite.

Q. And is the shale overlying?

A. The shale overlies. As a matter of theory the definition of a hanging wall has been made by the gentlemen of the other side on three things: One is the Richmond fissure shown on level No. 7 of the Richmond, a clear, distinct fissure in limestone, without clay or shale in its vicinity, showing no clay whatever. The second stage of their hanging wall appears at a short distance from this is shale, argillaceous, calcareous shale which overlies the limestone. These two have no connection whatever. The one is a sedimentary deposit, laid down upon the limestone, the other is a physical rupture of the limestone. They have no actual connection, and they have no geological connection, and they cannot by any means that I can see be related to one and another as a lode wall. The shale which is conceived to be, and held to be, but a part of the lode wall, is incontinuous; it does not extend beyond the middle of the Atlantic claim, and nowhere else appears to the eastward in the—no, I am wrong. It does not appear southeastward of the level which leaves the Eureka 9th cross-cut which goes from the Eureka 9th eastwardly at point 99, and never again appears in either the Eureka or K. K. The third feature which has been attempted to be connected with this is a limestone fissure which is seen in the K. K. and which trends into contact with the quartzite. That limestone fissure is neither the Richmond fissure of this point [showing] nor is it the shale of the intermediate point. The whole three have no con-

889 nection whatever; they do not form a continuous wall; there are two fissures in the limestone and one of stratified shale which have been sought to be connected and made into a hanging wall.

Q. You spoke of a fissure on the 7th level that is made to do service as a hanging wall in this case?

A. The Richmond fissure?

Q. Between what two points is that fissure exposed?

A. It is exposed from—I can't tell which of these bearings refer to drifts. There are two drifts here vertical. Mr. Westcoat is here, he can tell.

Mr. Westcoat.—The 7th.

Q. Well, I mean the bearing, if you will come here a moment.

A. It is from a little to the south of point 73, then northwesterly the whole length of the northwestern cross-cut.

Q. Does that fissure extend to the fissure at any point?

A. Not at all, so far as I know.

Q. If it did extend to the shale anywhere near the point of its exposure there, it would be open to the workings of the Richmond 7th level?

A. Yes, sir; it would.

Q. Is there any clay or shale disclosed in that fissure?

A. No, sir.

Q. Did you examine the clay seam that is found in the Bell-shaft tunnel and the Utah tunnel?

A. No, sir; I was not there.

Q. Does the shale found in the K. K. seem to be of the same character as the shale found in the Richmond 7th level?

A. There is no shale in the K. K.

890 Q. The clay that is found in the K. K., does that resemble the clay that is found in the Richmond 7th level?

A. No, sir; not at all.

Q. Why do you not consider all of the limestone lying between the quartzite and the shale as a lode?

A. The main reason is, that there is no foot wall or hanging wall, nothing but limestone; a vague, coherent limestone, without a foot wall or hanging wall or ore, does not constitute a lode. The fact of its coming in contact with the underlying and overlying members of the same sedimentary series, do not constitute it a lode. If that was a lode, there is no reason why the entire auriferous quartz-bearing zone of California, 60 miles wide, should not be located as one lode.

Q. The zone of limestone lying between the quartzite and the shale has been compared to the Comstock lode. Will you explain the difference between the Comstock and this zone, in structure and origin?

A. The main essential difference between the two is that one is

a lode and the other is not. The Comstock is very clearly a lode, for the reason that it is bounded upon its foot-wall plane, and upon its hanging-wall plane, by distinct, continuous, well-defined vein-fissures. The rock through which the Comstock lode is cut is in no case sedimentary; and the relations of the two are not those of stratific superposition; but these, the east country rock, has poured around a mountain of older rock. It is a case in which the volcanic rock has deluged and poured around the base and flank of an older mountain. The fissure is here at the contact of these two, for the most important part. At the other other parts it is altogether a fissure-lode in the overlying volcanic rock. The

891 distribution of those horses which form the body of the lode between the foot wall and hanging wall, are determined by a series of steep, deep fissures intersecting the one prominent and dominant foot-wall fissure. I can show that very well on the blackboard. Let line A B represent the foot wall of the Comstock; and the line A to G represents the surface. Here is a distinct fissure following down this line of contact all of the way. There are others, often two or three fissures descending deeply through the overlying country rock, always connecting downward with the lower fissure, always connecting with the foot wall, or this which is the hanging wall on the trend. The structure at Eureka, of which this represents the surface outline [showing], is a belt of quartzite which was formerly a horizontal bed, a belt of conformable overlying limestone, and a belt of still overlying shale. There is no lode relation between the three whatever. I don't see that there is any possibility of any lode connection uniting them.

Q. Are they not entirely different in their origin?

A. Certainly. The one is a series of sedimentary beds laid down in the ocean, and turned up. The other is a fissure extending between two rocks.

Q. The masses of country rock that are included between branch fissures of the Comstock are called horses, are they not?

A. The are.

Q. Why are they called horses?

A. That is a technical term used to describe certain masses of country rock which have fallen into an open, yawning fissure, or which lie between communicating fissures of the same lode. In this case they have not fallen in. They are *in situ*, and are divided by clear fissures or veins which belong to the fissure-stem of the Comstock.

892 Q. Then the Comstock lode, horses, and vein-matter are included between well-defined fissures, isn't it?

A. Yes, sir.

Q. And the limestone zone that is found on Ruby Hill between the quartzite and the shale is not included between any fissures?

A. They are not included between any fissures. It is a part of a conformable series of strata.

Q. Then there is no sort of resemblance either in origin or present situation between the Comstock and the body of limestone between the quartzite and shale of this mine?

A. Only to an imagination far livelier than mine.

Q. Do the lodes belong to an entirely different class of lodes?

A They do.

Q. What is the Comstock lode?

A It is a true fissure-vein, which, incidentally, for a certain part of its length, is a vein of contact; and then passing beyond those limits is a vein contained in the same rock, and with the same character of hanging and foot wall.

Q. What is the filling of the Comstock vein, that is supposed to have come from below?

A. It is a vein of quartz which has subsequently mineralized.

Q. The quartz is the matrix proper of the ore?

A. The quartz is the gangue.

Q. What is the filling that is supposed to have come from below of the Eureka and Richmond lodes or ore-bodies?

A. Judging from the present filling, as we now see it, of the Richmond, and all of those lodes, is a mixture of the oxide of iron, carbonates and oxides of lead, a very little galena, some
893 sulphate of lead, which is usually mistaken for galena in the vein, and which is usually locally called galena, but which is not. Those are the materials that come from below.

Q. And that have been filled into the cavity?

A. Yes, sir. There are a number of other lodes which I have studied, of a similar character and history. I should have said that this ore has a variable amount of silver and gold. The history is probably that of many other kindred lodes, which were filled first with auriferous pyrites and argentiferous galena, having been subsequently oxidized *in situ*.

Q. You have already explained that no portion of the zone of limestone came from below, but was of sedimentary origin. Therefore, that forms no part of the lode, for the reason that it originated at the same time, came from the same source as the ore, and it is no part of the lode, because it is not surrounded by a fissure like the Comstock?

A. Taken together they constitute it not a lode.

Q. What is the difference between the occurrence of chimneys of ore in the Comstock and the occurrence of pipes or chimneys of ore in this zone of limestone? What is the difference in these surroundings?

A. The Comstock ore-bodies are irregular shape, detached bunches of ore not arranged with any linear continuity. Here there are more or less continuous tubular bodies of ore disconnected with any gangue.

Q. What surrounds the bodies of ore in the Comstock?

A. Quartz.

Q. That is a part of the vein-matter of the same origin, or supposed to be, with the ore?

A. They both of them came from below.

894 Q. The theory is that they came up in solution, in water, or in form of vapor, isn't it?

A. Water or vapor. There have been several introductions of metals in the Comstock from below.

Q. Then the ore-bodies, or bunches of ore, that are found in the Comstock are surrounded by quartz of, I suppose, the same origin with the ore, from the same source, and the bunches of ore or chimneys of ore in the mines of Ruby Hill are surrounded by rock of a sedimentary and entirely different and prior origin to the ore?

A. They are.

Q. Are not ore-bodies found in limestone usually more irregular than ore-bodies found elsewhere?

A. They are.

Q. To what is that to be attributed, mainly?

A. Mainly to the fact that limestone in mountainous districts, having been very much disturbed, are irregularly metamorphosed, and break with a sugay irregularity and rough fracture, very different from that of compact crystalline rock, or in the solid rock.

Q. Are there any modifying influences that operate upon the fissures and breaks in the limestone subsequent to their fracture that do not operate to so great an extent upon other rocks?

A. That the easy solubility of the limestone itself may change very greatly the character of the apperture.

Q. Will you explain, now, the connection between the Margaret and the Richmond workings, and its relation to the Richmond ore-bodies?

A. At the 5th level of the Eureka mine, having passed from the Lawton shaft in a northwesterly direction 600 feet or more, on the barren contact of the quartzite and the limestone in the re-

895 gion of the letter "M" within the claim of the Margaret, I encountered a body of ore lying in the contact, upon the quartzite. The quartzite at this point has made an abrupt almost rectangular bend, the direction having changed almost at right angles. This ore has been traced upwards 40 or 50 feet into the ore-chamber; which, in passing upwards leaves the quartzite entirely the limestone, and ends, so far as we now know. Down from this point the ore continues further than is marked on this map, out to this compromise line, or nearly thouching the compromise line; and the body of ore has been stoped out surrounding this point "59," I think, and along there. Downward from this point by the winze there is an ore connection with this short level, which runs from "59" to the letter "M." This body of ore continues down this winze to "M," and down to "69 D," where there is a small part of the 6th level disconnected with the main level. Along this 6th level to "69 F"—that is, about 80 feet—there is no ore; I am not quite sure of that. Yes, there is

an ore connection straight down from the ore-chamber here through "69 D," and down the winze from "69 F" to point "79 G;" there is a connection down through there. There is also an ore connection down the winze "79 G" to "79 E," and ore along the contact as far as the first point in the 7th level from "79 E" to where the quartzite deflects. On the other turn of this level, from "79 C" to "79 D" is also ore on the quartzite. There is also ore from 79 D down through the series of winzes to the point 79 H and 49 A, in red ink. Also, through to 49 and down to 48, where it makes a connection with the Richmond 4th level. But that connection in the 4th level of the Richmond is not with the main Richmond fissure, but with that back fissure which I have described as
896 diverging from it. There is an ore connection down through this complicated series of winzes which connects this Margaret ore-body, which lies in the quartzite, and brings it down to the Richmond 4th level, where, instead of connecting with the Richmond dip there, it underlies the underlying or diverging spur of the Richmond lode [showing on the blackboard] and it runs down to the 4th level, on which the connection between the Margaret and the Richmond ground is that the body of ore that appears in the Richmond underneath the end of the fissure, and is in no way connected with the upper or main fissure of the Richmond.

Judge Sawyer.—Nowhere, except through that spur?

A. There is barren limestone between the two?

Q. The connection goes up, then, outside?

A. Yes, sir; the fissure, which is a barren fissure up here, goes 230 feet up and connects with the main Richmond fissure, and the body makes under water. The winze from 57 to 59 is not now opened. It is used for dumping. Through this northerly and westerly set of winzes, from the Margaret, there is a connection straight down from this set of winzes. It then appears in the Richmond underneath that fissure. Going into the Richmond a little way it gives out [showing on the blackboard]. The ore makes down on this right angle and underneath that fissure, but does connect with it. It stops when it gets into the Richmond like that [showing], and does not connect with the main ore-body at all, or with the main fissure.

Mr. Thornton.—Q. That is, the ore does not connect with the fissure?

A. No, sir.

Q. But this other fissure does?

897 A. That fissure connects upward with the Richmond, as I have shown. But the ore leaves that fissure and goes up the quartzite on a right angle turn. Where this spur from the Richmond mine cuts that angle of quartzite it makes a bunch of ore, which does not go around the body of quartzite. The body of ore is confined to the point of the quartzite where the Richmond spur

strikes it. That winze from 79 to 79 A is now used as a shute for ore. I was unable to get down it. There is a winze from "79 A" to "89 C." That winze follows down on the contact of the quartzite and the limestone. About 15 or 20 feet down is a little piece of galena on that contact, the only ore which I saw in that winze at all. There is a little limestone here and there down, but no ore whatever, and no ore connection between this Margaret body here and the 8th level of the Eureka. In other words, the only connection of ore between the Margaret body and the Richmond is down this northerly set of winzes, where it does not connect with the main Richmond fissure, but with the spur. And the only ore here is made at the angle of quartz where this spur comes in.

Judge Hillyer.—Q. The fissure upon the quartzite, has that been explored?

A. It only touches a point of the quartzite. It goes off into limestone.

Q. And goes up, you say, to the Richmond third level?

A. Yes, sir.

Q. Is that known by workings?

A. There are winzes down there following it down. It is well displayed by winzes.

Mr. Wren.—Q. I understood you to say that that ore-body ends a the limestone, to all appearance?

898 A. It does. So far as we could see it turns out from the quartzite and enters the limestone, the feathery edge of it.

Q. Is the ore worked out, apparently?

A. Pretty nearly.

Q. It does not extend almost toward the Champion bed?

A. It does not so at all. It ends in the limestone.

Q. And the quartzite, owing to the relative levels of the ore-bodies at the northwest end of the Eureka 5th level and the ore-body in the Champion must be very flat, must it not?

A. Yes, sir; it must make a very flat curve, and then pitch steeply, and with a double curve. Lest there should be any misconception as to the relation of these two fissures, I should say that, in passing into the Richmond ground, all of this being limestone and this being quartzite [showing], they enter together the cave, and so far as we know do not extend beyond that. That is a spur. There is no appearance of a spur beyond that.

Mr. Wren.—Q. Do you find any evidences of the contact lode?

A. No, sir; no evidences whatever of the general contact lode. Quite the contrary. But I do find that where these fissures which come from the limestone, diagonally against the quartzite approach in that angle there are ore-bodies of more or less extent on the quartzite. That is true in this region here, where it runs into the interval between the and the quartzite, and also in the K. K. mine, where from the so-called hanging wall the fissure in

limestone comes in at an angle, or touches the quartzite; and within that part of the angle is found ore in the quartzite; and again
899 in the Jackson mine the same phenomenon is represented. A fissure coming in through the limestone in that case not at all parallel with this, but making an angle with the quartzite, and in that general region considerable ore forming on the quartzite.

Q. Have you any reason to suppose that the solutions from which these ore-deposits came, came upon the line of contact between the quartzite and the limestone?

A. Judging from their appearance they are characteristic of the limestone, and their appearance on the quartzite simply depends upon the communication of the limestone-fissure with the quartzite. Here is an enormous exposure of quartzite in that very ore, and the main amount of ore has always been taken from limestone; in the Richmond mine 150,000 tons, as I learn from the accounts, have been taken out, and perhaps as much more low ore is left. The main bodies of ore taken from the Eureka and K. K. have been from the limestone, but the relative proportion of ore obtained contiguous to the quartzite, has always as a rule been very small.

Q. Then your idea is, that a solution came up through these well-defined fissures that you find in the limestone, and not along the line of contact, between the line of quartzite and limestone?

A. Not at all. That the fissures are limestone fissures, and that owing to the hardness of the quartzite, when they strike that they probably give out, and, as far as we know, they do give out, and that the filling was through the limestone fissures. That the limestone-fissures are the lodes, and that the ore upon the contact is the accident of the approach of the lodes to the quartzite.

Q. Is there anything else that you decide to state that has any bearing upon the case?

900 A. I don't know of anything more.

Q. Do you find the limestone between the ore-bodies crushed, and the small seams and fissures made by crushing, filled with ore or with iron?

A. I do not. I find that is only very exceptional and accidental to the case.

Q. The limestone is generally a compact limestone, and exhibits no trace of metals away from the ore-bodies, generally?

A. That is generally so.

Q. Is there any difference in general appearance between the limestone that lies between the quartzite and the shale, or is the shale shown on the map, or not?

A. Do you mean, are there differences within the belt of limestone?

Q. Yes, sir.

A. There are. They vary very considerably within this belt of limestone. You find light, creamy, and almost white limestone,

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Q. Yes, sir.

A. There are. They vary very considerably within this belt of limestone. You find light, creamy, and almost white limestone,

and dark blue, and some stratified and some not stratified, and some more or less crystalline.

Q. Do you find those general appearances confined to any portion of that limestone?

A. No, sir.

Q. The general character of the limestone, then, is the same throughout?

A. That is variable, like all limestone.

Q. I speak of the general character.

A. No, sir.

Q. Do you know what is called the Bell-shaft tunnel?

A. I have not been into it. I know where it is.

901 Q. Do you find any difference between the limestone on the surface, from the Bell-shaft tunnel southwest over to the quartzite, and the limestone from the Bell-shaft tunnel to the northeast over to the shale, as shown upon that map?

A. No, sir. I find in any one of these lines that it constantly varies, so that I see no characteristics between the two.

Cross-examination:

Mr. Thornton.—Q. In connection with your exploration of the 40th parallel, you have written a treatise of three chapters, of the Comstock?

A. Yes, sir.

Q. That description of the Comstock, so far as it goes, is correct, isn't it?

A. To the best of my knowledge, I believe it is.

Q. It is found in the third volume of the Explorations on the 40th Parallel?

A. Yes, sir. It is the 2d chapter of that volume. There is only one chapter concerning the Comstock lode—the 2d chapter, with three sections.

Q. Whatever appears in this book published by Mr. King, with your name to it, is what you wrote concerning the Comstock?

A. Yes, sir.

Q. Speaking of the general analogies, not the particular differences, between the great Eureka lode and the Comstock lode, I will ask you this question: How has it happened in the Comstock that ore has become aggregated in the form of chimneys, instead of being disseminated very generally throughout the lode?

A. I should begin by denying your fact.

Mr. Thornton.—We offer in evidence here that book of Mr. King's.

902 Q. Did you testify on a former occasion, about three years ago, in the controversy between the Eureka Consolidated and the Richmond, as to the characteristics of this vein?

A. I did.

Q. And after examination of the workings to some extent of these mines?

A. Yes, sir.

Q. I will read to you from the report of your testimony on that occasion, and see if this is what you testified to?

"Q. Did you examine the works over to the Buckeye and Champion?

"A. No, sir; simply to see the outcrop here and there along.

"Q. Mr. King, supposing that a great many places throughout those works large bodies of ore were worked out, and you should find limestone all around there, would you still consider that they were veins?

"A. Most unquestionably, taken together with the evidence of the Richmond and the linear position of the outcrops on the hill.

"Q. Where would you say that that vein continues in its course from the Richmond?

"A. Well, I should say that it recurred in the—I am not absolutely certain as to the lines of those different claims belonging to your company, but in the Champion and at the outcrop of the Buckeye, and I am not sure if I know exactly what the Sentinel claim is, but there is quite a large opening round with chambers in it. I suppose that to be the Sentinel.

"Q. I don't know the names of those claims you refer to myself, but I know where the working you refer to is; it is up on the hillside.

903 "A. Yes, sir; it is up on the hillside, and I suppose from that it continues with the same curvature, and perhaps lateral fracture faulting, as we call it, across the hill to the Phœnix?"

A. That is substantially my testimony.

Q. Next we come to the Richmond mine, and going along the quartzite, in a certain direction, are the claims of the Eureka?

A. Yes, sir.

Q. Then the Champion, the Buckeye, the Sentinel, the K. K., then the Phœnix, and then the Jackson?

A. Yes, sir.

Q. At the time you testified, the workings in the Richmond had extended down under the surface lines of the Lookout claim, hadn't they?

A. Yes, sir.

Q. At that time you made an examination of the ore-chambers and excavations, which have caved since you were in there at that time, did you?

A. Yes, sir.

Q. And extending out toward the Champion from the Tip-Top incline?

A. I did. I examined everthing that was open.

Q. The Champion outcrop chamber was then open, wasn't it?

A. Yes, sir.

Q. Did you also examine the Iron shaft, just sunk?

A. I did. I had examined it at the time.

Q. [Referring to tracing.] At that time the Eureka Consolidated Company, owning its Lookout claim, was contesting the patent title for the possession of that ore-body, wasn't it?

A. Yes, sir.

Q. And contended that that was a separate ore-body, which belonged to their patent, didn't they?

904 A. Yes, sir.

Q. And the Richmond contended, and you for the Richmond, that this was a vein in its lesser extent, going along the hillside to the Champion, the Buckeye, and the Phœnix?

A. No, sir; I testified that the Richmond was on the lode; that this contested ore-body here was a part of the Richmond lode. I testified to that as a matter of fact. I was then asked whether it was my opinion that this connected through here. I did think so, and stated it as my opinion.

Q. And that that was the linear extent of the lode?

A. As a matter of opinion.

Q. You said that this ore-body, being entirely surrounded by limestone, and it being impossible to make any connection, and none having been made yet, over in that direction, that even if it were entirely surrounded by limestone, it would make no difference in your opinion?

A. Yes, sir; because at that day I characterized this as a pipe-vein.

Q. The same as you do to-day?

A. The same as I do to-day.

Q. Let us see how near the tracings have brought these together since you were there, and upon what you base your change of opinion. You recognized the Champion outcrop on the tracings?

A. Yes, sir.

Q. You recognized the ore-body from 5 to 6, on this map, Exhibit 1?

A. I have seen the bottom part of that.

Q. Did you ever go up that winze?

A. No, sir; but I saw that the ore extended up there.

905 Q. Up to the level of the Champion tunnel?

A. Yes, sir.

Q. Did you come along the drift from 5 to figure 4, to the winze at that point?

A. Yes, sir.

Q. Did you find any ore in that drift?

A. I have no memory of any whatever. If there is any, I don't remember it.

Q. Did you look for it?

A. I went looking for whatever there was there. I remember no ore through there.

Q. But you cannot state positively that there is none there?

A. I don't think there is. As my memory serves me, I didn't see any to speak of.

Q. There has been a good deal of testimony on the point, and we think we can show that. We want you to swear positively upon that point.

A. I can't be positive; but as well as my memory serves me, I know of none.

Q. You state it with some qualification.

A. Yes, sir.

Q. Did you go down any of those winzes to the level of the Lizette tunnel?

A. I went through all of the winzes.

Q. Did you find ore in those winzes?

A. I came along the level of the Lizette tunnel to the bottom of the winze; and near the point R, about 25 feet or 30, up that winze, ore was encountered, and followed up, in irregular, varying chambers, nearly to the level of this drift.

Q. Was there ore right at the top of this winze where that drift comes in?

A. Yes, sir; low-grade ore.

906 Q. Then there was ore from the top of this winze down to within 29 feet of that tunnel?

A. Yes, sir; that is, an ore connection down to within 25 feet of the Lizette tunnel.

Q. How far from the bottom of this winze before you found ore in that level?

A. I saw no ore in that level.

Q. Did you hear Mr. Hague's testimony as to what is in there?

A. No, sir.

Q. State what you remember about it.

A. [Showing on map.] As I came in through here, at a point not marked on this tracing, in an old, partly-closed cross-cut going to the right as you come into the tunnel. The place was nearly full, and I got over into this, and went to the end and found generally limestone, with considerable cavey ground, and a little reddish oxide of iron and earth; but nothing like ore at all.

Q. Low-grade ore in that, was there?

A. It was ferruginous matter.

Q. Of what extent was it; as big as this room?

A. No, sir; a very small body.

Q. Now, passing on beyond that body, between that and the bottom of these winzes, do you find any ore?

A. No, sir.

Q. Ore matter, or ore stains?

A. The limestene at places has little reddish stains. But it is limestone, and not ore. It was slightly stained at points.

Q. Were there no bunches of anything in there?

A. I saw no bunches of ore, or low-grade ore, except at this point [showing].

907 Q. No bunches of orey matter or ore-stained material?

A. I didn't pay attention to the slightly-reddish limestone. There is a good deal of that over the whole country.

Q. You recognize the ore-chamber at the point 5?

A. Yes, sir.

Q. And you think it connected with this limestone incline which has ore stains in it?

A. Yes, sir; I did think so.

Q. And you have seen nothing now in your explorations to change that opinion?

A. No, sir.

Q. Did you ever see any seam of ore or orey matter across the Iron shaft?

A. I have seen little iron stains there.

Q. What was it that the miner went down there in search of, in that shaft?

A. The stained stuff. As he has gone down in hundreds of holes in those hills—little, insignificant, meaningless ore stains—looking for ore.

Q. And that crosses the Iron shaft?

A. Yes, sir.

Q. Coming on down here, you say that there is a connection between the fissure of the Richmond and the 5th level ore-body of the Eureka?

A. Yes, sir; there is a fissure connection with the 4th level.

Q. And you believe that that is a part of the Richmond vein or lode, as you call it?

A. I believe that is a spur of the Richmond lode.

Q. And consequently a part of it?

A. Yes, sir.

908 Q. Can you point out on the tracing where the quartzite turns in that direction at the angle you have spoken of?

A. There is one on the fragment of the sixth level; at the red line.

Q. Where is it on the fifth level?

A. [Witness shows.]

Q. Nearly all of that ore-body marked "ore-chamber 11," and almost half of that ore-chamber marked "ore-chamber No. 12," are on that side of the turn in the quartzite?

A. Yes, sir. They occupy together a part of the curve. It is not a sharp right angle, but it is a curve.

Q. Do you state, as a matter of fact, that in going up from that ore-body towards the surface that you still see where the work stops a small seam of ore going on up in the limestone?

A. I do.

Q. So that that ore does extend up there towards the surface, is

not absolutely dug out, so that you see it overcapped by the solid limestone?

A. It has a weak, orey appearance at the edge.

Q. And tracing the wall going on up?

A. Yes, sir.

Q. We have brought the body of ore to this point "R" on the Lookout, near the dividing line at the Lookout and At Last?

A. Yes, sir.

Q. And we have ore at that point?

A. Yes, sir.

Q. But still you think that there is no probability or ground for believing that that cropping and this cropping can be connected in ore?

A. I know they do not. This is a body pitching in that
909 way; dipping about north, down the angle of the quartzite. [Showing.] While this is a perfectly isolated vertical body of ore, absolutely surrounded in every direction with limestone, and its major axes as a body is up and down, vertical.

Q. Does that part of the ore-chamber 11 not dip down in that direction towards the letters "ar" in Margaret?

A. That part of it does. It is, as I said before, on the curve.

Q. There is nothing in the dip to prevent that running on up there, is there?

A. Yes, sir. The dip of that continued would not bring it near that.

Q. It would carry it toward the Champion croppings?

A. No, sir; the Champion croppings dip the wrong way. The Champion croppings are in the reaching of the surface, where the limestone has been very much crushed. They dip a little west of south. The Margaret ore-body dips down to the Richmond 4th level, nearly north, as a general line; but the Champion body dips the other way, nearly south.

Q. Now, doesn't the quartzite commencing at the point marked "R" upon this map, dip on down until it underlies the ore-chamber at 11?

A. I think that there is no doubt of that.

Q. Why wouldn't that, passing on by the quartzite, come to the Champion croppings, or under the Champion croppings?

A. It would not come to them. It would come to the quartzite there, behind the Champion croppings.

Q. Then, if the Champion croppings connected down with the quartzite through any seam or fissure, they would connect with that ore-body extended up the quartzite to the surface at "R?"

910 A. It depends upon the character of the seam or fissure.

Q. If my supposition is correct——

A. I should have to see the ground to say that.

Q. Of course, if it is against you, you have to see the ground.

A. If there was a fair ore connection, this way or that way, connecting with the body, and this body was proved to follow up to the quartzite, then the question to be determined would be the question whether they were on the same line or not. The fact of ore-bodies touching does not make them one and the same lode.

Q. They may come together, and touch, and not be in the same lode?

A. Ore-bodies may.

Q. And these two ore-bodies may touch and not be in the same lode.

A. I can conceive of such a state of things.

Q. And if the ore, of which this ore-body 11 is a part, does go on up the quartzite; and if it does go down in the limestone until it touches the quartzite; and if the two ore-bodies should touch each other, you would still say they might be parts of separate lodes?

A. If they were found to be one and the same lode, as you suggest, I should admit anything that was proved.

Q. You say if they went up and connected to that ore you would still say they might be separate lodes?

A. I should want to look at it very carefully. I have made one mistake there, and I shall be very careful on that mashed surface ground again.

911 Q. State to the court if the developments have not done a great deal more to demonstrate the identity of the ore-body in the Richmond with the ore-body in the Champion since your former testimony, than the developments that were to be seen there before?

A. Looking vertically down at the map it has that appearance. But the actual geological relations of this and that [showing], and this and that, and this and that, show no connection together, so far as I can see. It is one thing to look down upon a map and see the condition of things projected on one horizontal plane, and another thing to make a connection with them, giving their proper dips and angles. It is very well shown on the model.

Q. Now, you speak of this cap of quartzite over here. You said there was a general connection or unity between the different ore-bodies of the Eureka, at that end of their claims?

A. I said there was a suggested unity. I think that having an example of a good continuous pipe-vein here, and having an example there of scattered bodies of ore, going down with a certain parallelism and circumscribed within reasonable narrow limits, gave probability to the opinion that that is another pipe-vein.

Q. But you don't assert that it is another pipe-vein?

A. I assert it simply as a probability.

Q. And it embraces all of the bodies of ore?

A. Yes, sir.

Q. Do you notice that this cap extended out to 99 R diminishes on this level as you go up to the surface?

A. Yes, sir.

Q. That is the cave represented on the fifth level at 55. Now, on the 7th level, where is it represented?

912 A. In passing up the quartzite; instead of continuing up in the gap it becomes pretty straight here. The cap is confined to the lower level, as a large cap.

Q. But isn't it something of a cap as found on those levels?

A. It may be a question whether it is or not.

Q. Now, suppose that that represents the cap as Mr. Westcoat has drawn it there on the 7th level. Around the point of that cap on the upper levels of the Eureka, are there not ore-bodies found on each side of it?

A. There is not any cap upon each side of it, and there is not any cap up there; but there is a cap at this lower level; and the influence of that deep cap, as I believe, has been felt upwards in determining the positions of the ore-bearing zones.

Q. Did you go down the winze from the ore-body on the 9th level of the Eureka to the bottom?

A. Yes, sir.

Q. What did you find down there?

A. I went down about 40 feet through the winze, beginning at 93. That is in ore. In the 9th level of the ore-body of the Eureka it goes down about 40 feet in ore; but the ore-chamber continues to the southward, and there, at winze 96, is the incline which rests upon the quartzite, and it follows down the quartzite. From this ore-body there is a continuation of low-grade ore down that winze. At the bottom of that winze is a drift running to the south which rests upon the quartzite and carries ore to the end. There is, then, from the bottom of that incline, a winze to the end of the drift, running towards the Richmond ore-body, and it is in barren limestone. I saw no ore-matter in that. I looked for it at the time of my examination in there, and I saw no ore-mat-

913 ter whatever. There was positively none there when I looked at it.

Q. Now, where does the quartzite turn back on its angle to the Richmond side of the 9th level ore-body?

A. The 9th level is a little above our 6th level. Here [showing] is the quartzite coming this way on the Eureka 9th level, shown in these cross-cuts here, and seen also in the end of that cave. Near the point 90, of course, it goes through there. It doesn't make a right angle turn at this level. That bend of quartzite has given out on the downward plane on the 6th level; and it is found there just where it should be, giving it a slightly sinuous line, but no right angle at all. The right angle has given out. It does not turn back at all. Below that level the quartzite never turns back, so far as development shows.

Q. Is there any development at point 60?

A. Yes sir; the 7th and 8th levels, and it does not.

Q. Is there not a line of quartzite base, or surface, for that ore to extend up upon to ore-chamber 11.

A. There is a contact of the quartz and limestone, but the ore does not go up.

Q. You spoke of finding ore at places along there?

A. No, sir.

Q. At 79 D you spoke of galena?

A. I spoke of one place, which is marked there, where there was a little bunch of galena.

Q. Isn't there ore or orey matter all of the way up and down that tracing?

A. At the time of my visit, from the cave level down to the Eureka 7th level, that was closed, and was not accessible.

Q. From the cave level up to 27, how was it?

A. I saw no ore whatever.

Q. And no low-grade orey matter?

914 A. No, sir; you will occasionally find stained limestone here, the faint oxide of iron stains.

Q. Following along the winze at "79 A," and down to the 8th level, what did you see?

A. Some oxide of iron stains. In places there I saw a good deal of ferruginous matter.

Q. From there down to the cave, what did you see?

A. From there down? You cannot go that way.

Q. You didn't go from "89 C" along to the cave?

A. No, sir; I went out to the edge of the cave. That is nothing but limestone.

Q. The winze "89 F?"

A. Yes, sir; that was without ore.

Q. Did you see ferruginous matter?

A. Mildly, ferruginous matter.

Q. Did you see ferruginous matter?

A. Light ferruginous matter.

Q. You have testified to a belt of limestone lying between the Richmond and the Champion. Now, show the lines across on the map, with these two pencils.

A. I testified to barren limestone over there. In my testimony about this, I simply said what the diagram shows, that that level was in limestone, and that and that [pointing], and that this was an isolated body.

Q. Can you draw two lines across there that will cross those ore-bodies, or the projections of those ore-bodies, to show what is the greatest extent of barren limestone between the Richmond and the Tip-Top incline, and the Champion croppings?

A. There are 200 feet between this excavated body on the Rich-

mond claim, at the point marked "5," in pencil, 200 feet of ore between 5 and 6; but that ore is 100 feet up.

915 Q. I was having them all projected on the same plane, so as to see how you could get through that body of limestone without striking ore. The Iron shaft would come between these two shafts about half-way?

A. Yes, sir.

Q. And if there was ore in the Lizette tunnel 90 feet from the bottom of the winze, at R, wouldn't that lessen the distance between the ore-body at 5 and the Iron shaft?

A. Yes, sir; the more bodies you put in them the more you would lessen the distance; but I didn't see that ore-body.

Q. I am taking that simply upon the testimony of Mr. Hague, at 91 feet. Do you say that the evidences of the extension of this lode from the Tip-Top croppings to the Phœnix is as good now as it was when you swore before?

A. Certainly, I will.

Q. Isn't it a great deal better?

A. No.

Q. Some better, isn't it?

A. I don't think it is any better; I don't see that that vertical body there has anything to do with that connection; I don't think it has changed at all.

Q. You don't think that finding these ore-bodies opening in there between the Champion and the Richmond strengthen the point at all?

A. I don't know any bodies that have been opened since then, except that one vertical body.

Q. Have you examined the lines of exposure of the lode from the Champion on to the Phœnix?

A. No, sir; I have not.

Q. To see whether it is as good as when you swore it was good before?

A. I didn't swear it was good before.

Q. You gave your opinion it was good?

916 A. I gave my opinion, as I have before expressed, based upon the geological parallelism and the position.

Q. Now, commencing at the Champion, do you believe that the same lode extended on to the Phœnix, as you testified to before?

A. I have not looked over that ground at all, but I think there is a probable connection of those bodies of ore, but not a proved connection.

Q. To the Phœnix?

A. About the Phœnix I have no opinion.

Q. Will you now testify to the same opinion that you then had—that it is a continuous lode or vein from the Champion to the Phœnix, leaving the Richmond out entirely?

A. No, sir.

Q. Why do you change your opinion, if you have not looked at the ground since?

A. Because, having once entertained the opinion that there was a connection through here, and having had it demonstrated to my satisfaction at such an immense cost that it does not go through, I should not like to bridge any gaps anywhere else.

Q. Do you know that there are any gaps anywhere else?

A. No, sir; but I should want to see a great deal of underground work before I should believe in any connection here any more.

Q. In speaking of that barren belt of limestone, you testified a short time ago that this ore-body of the Margaret would have to pass through that long belt of limestone and through the cap to get over to the ore-bodies of the Eureka, which was on the other side?

A. I didn't so testify. I testified that the Richmond bodies would have to do it.

917 Q. Do you know whether or not ore was found at that exact point marked 99 A, testified to by some of your witnesses yesterday?

A. No, sir. At 99 B there was ore, but I saw none at 99 A, though there may be a little ore there.

Q. How is it at 99?

A. None whatever.

Q. 99 A is the point of the cap?

A. Yes, sir; I have no memory of any ore there at all.

Q. How does the sulphate of lead appear in the mines there?

A. It appears as a gray mineral, the color of galena, and, to the ignorant eye, a good deal like it.

Q. How does it appear like galena; in small white crystals?

A. No, sir; nobody but a congenital idiot would take white crystals for galena.

Q. Does the sulphate of lead appear in these mines in the shape of white crystals?

A. No, sir; the carbonate does, and the sulphate of lime does.

Q. In your former testimony you were asked this question, I believe, on your direct examination by Mr. Wren:

"Q. Then you should say that this was a pipe-vein, should you?

"A. I should say that the developments had not gone far enough 'to make a fine thing, but that generally I should claim it to be a 'bed-vein, but particularly, probably, a pipe-vein; that in the in-'fancy of a large affair like this it is difficult to narrow the scien-'tific terms down to a fraction, but that generically I should call it a 'bed-vein."

A. Yes, sir; that is correct.

918 Q. Did you say it was a bed-vein?

A. Yes, sir.

Q. Did you say it was a pipe-vein?

A. Yes, sir.

Q. Did you say it was a fissure-vein?

A. Yes, sir.

Q. A true fissure-vein?

A. No, sir. I said a fissure-vein; I said a bed-vein; and I said a pipe-vein.

Q. You gave it those three names?

A. I did. A fissure-vein is a bed-vein when it follows approximately the plane of bedding or stratification of the rocks. A pipe-vein is a more or less elongated tubular ore-deposit following the line of stratification. Consequently, a pipe-vein is a bed-vein because it follows the bed, and a fissure-vein because it follows the fissure. One may be all three.

Q. Did you ever see a pipe-vein, except this?

A. Yes, sir.

Q. Where?

A. Two: one is the Emma, in Utah; and the other is the Union mine, at Inyo county, Cal.

Q. From what authors did you derive your idea of a pipe-vein?

A. I have looked over a very large number of books in my own library, whose titles I could not give you. I like Jukes' definition of it as well as anybody's; and I think I shall stick to him. He is a geologist that takes a broad view of things, and I like to follow his classification.

Q. Is the definition which Jukes gives original, or is it quoted?

A. Jukes gives a definition of pipe-veins himself. He may or may not quote it; but it is his selected or original definition.

919 Q. Is it a definition or a description of pipe-veins?

A. It is a description short enough to be considered a definition.

Q. What is the gangue of the Emma mine?

A. It has no gangue, like a great many other veins.

Q. You say the Emma mine has no gangue?

A. No, sir; it has not. Generally, we should call the crushed material a gangue, but I don't think that, strictly speaking, it has any gangue.

Q. What crushed material do you call a gangue; a crushed limestone?

A. Partly that, and the decomposed material that went with it; and the infiltrated material that were crushed with it.

Q. Did you write a letter, dated "Salt Lake, June 11th, 1873," to the Emma Silver Mining Company, limited, London?

A. Yes, sir.

Q. "The gangue consists of a finely brecciated limestone?"

A. Yes, sir.

Q. "Together with some quartz, sand, and silicious impregnations?"

A. Yes, sir.

Q. "Taken as a whole, the gangue is a local product, being, in

'fact, only a much-shattered zone of country rock, overlying the 'foot wall."

A. Yes, sir; I wrote that.

Q. "Through this crushed and sugary limestone the ore has 'lain in bunches of irregular shape, sometimes replacing the lime-'stone altogether in large solid masses, and again penetrating in 'small threads and stringers in all directions. The solid galena 'was first found on the foot wall, a little below the dis-
920 'covery, and on exploration proved to spread in a great 'sheet over the whole foot-wall plane. Near the longitudi-'nal boundaries of the ore (along the higher limits as well as at the 'lowest developments) it is found that the galena gradually gives 'way to oxidized and sulphated products. This form of mineraliza-'tion, evidently an action subsequent to the original and main 'ore introduction, seems to have proceeded from below, rising along 'the hanging country and decomposing only on the hanging wall 'of the galena sheet.

"Into it, however, small irregular seams of ore penetrate for 'small distances, following planes of jointure; but they die out 'almost immediately, giving way to pure limestone. The main 'facts of the Emma 'bonanza' are, then, its general form of 'triangle, having a broadside measurably conforming to the surface 'line and terminating downward in a narrow pipe or chimney of 'vein stuff, whose ore has gradually, but surely, run down to a 'practically valueless grade.

"To recapitulate, there are, so far as I am able to judge, abso-'lutely no indications in the country rock bounding the ore-chamber 'longitudinally which invite immediate exploration *on the course of* '*the lode* with any fair promise of success. To the deep there is 'but the ore-chimney of poor vein stuff to build hope; but poor as 'it seems, it affords the most favorable leading now in sight, and 'should undoubtedly be followed.

"It ought not, however, to be forgotten that such a deposit is 'likely to make into 'bonanzas' in depth, which search, and only 'search, may develop. It is due the mine that exploration should 'be carried on with vigor and system, first to the deep, and, failing 'there, by longitudinal drifts."

921 A. Yes, sir; that is mine.

Q. Have you any explanation to make of that?

A. Yes, sir. I would say this: That as the mine stands at present, that crushed limestone may be called a gangue. But that brecciated limestone was not the gangue at the time the ore was introduced. The ore was not introduced into brecciated limestone as a gangue. The ore was introduced into a crack or fissure, and subsequent trituration of ore; and the broken ore and broken limestone together, may be, in the present sense, called a gangue. In a historical sense, it is no gangue at all.

Q. It is an actual gangue?

A. It is a gangue of to-day. It is a working gangue.

Q. Now, then, why isn't the limestone the gangue in the Eureka lode?

A. For this reason: that, historically, the ore has been introduced into cavities which were opened by fissures. It has never been brecciated with limestone, or mixed up with limestone at all. It does not permeate the limestone. It is in the cavities. And you could not call the limestone a gangue unless you call the limestone a gangue.

Q. Are there not small fragments or pieces of limestone in the ore-bodies in this lode?

A. These are horses, but not gangues.

Q. What kind of rock is the Emma mine surrounded by?

A. Marbleized limestone.

Q. What is the rock of that foot wall you speak of there?

A. That is also limestone. It is a bedded pipe-vein in limestone.

922 Q. And what is the hanging wall?

A. Limestone also.

Q. So there is a limestone zone running through there which contains these ores, in the Emma mine, is there?

A. Running through where?

Q. Running through between limestone on the either side?

A. No, sir. There is a limestone country rock which has been split or fissured approximately on the planes of stratification. That opening has been mineralized by the mixture of auriferous pyrites and argentiferous galena, and that has been mashed together by the movements; and the galena and the pyrites have been mixed up and brecciated more or less with the lime; a phenomenon different from anything to be seen in the Richmond.

Q. It is a pipe-vein; but you say entirely different from what you call the Richmond vein?

A. I say that is a phenomenon, not to be observed in the Richmond; the fact of the trituration of the lime and ore together.

Q. They are both pipe-veins, you say?

A. Yes, sir; they are, in my belief.

Q. What is in common between them?

A. They are both in limestone country rock; they both occupy cavities which are the result of fissures. Those cavities are on the plane of dip of the limestone, and run down in tubular shape, the Emma body tailing out as it went down, as some of the Richmond bodies have. The parallelism between the Union vein and this is, the pipe-vein is more nearly exact than that of the Emma, because of the restriction of the ore-body, and its being a more symmetrical pipe than this.

Q. What is the shape of the Emma pipe?

923 A. It has a broad upper trace where it approaches the surface, and it tails out to a long pipe downward.

Q. It has a triangular shape?

A. A long triangle.

Q. You call it a triangle in this letter?

A. Yes, sir; it is a long triangle.

A. Is it anything at all like a pipe? If it is like a triangle, is it like a pipe?

A. Yes, sir; the various bodies of which this pipe is formed are not in themselves symmetrical pipes; they are irregular-shaped bodies. Here is a full body, and here is a triangular body, at the the beginning of the Richmond; but at the top of the incline again they are small, and widen out as they go down. Fortunately the Richmond had the triangle going the other way. The Emma mine got the point downward, but the Richmond got the base downward.

Q. According to Jukes, isn't it a body of ore, a pipe within the vein?

A. That is one of the features of Jukes' description.

Q. But it is not according to your description of this vein, is it?

A. There is this difference: In the classical locality of pipe-veins, the old figures that Von Cotta cribbed or took from De la Bache, and which has gone the rounds of everything, shows a series of bodies known as pipes, running with the stratifications. There are often several of these, from one end to another, or at intervals, connected by a fissure-vein called a rake. So far as the fissure goes, that connects these bodies, I should simply say that the rake-vein ran with the pipes in this case, instead of counting them by a series of such stairs as De la Bache would. This has stairs
924 in it, and a rocky fissure connects these. But as long as these pipe-bodies are so nearly continuous, and so arranged in the line, it is, in my opinion, best to consider the whole thing as a connected pipe which has a rake-fissure running with it.

Q. You say this is an accommodation of the rock and pipe-vein?

A. I say that the ore-vein is a pipe, but that it has also a rake with it.

Q. Then it embraces both definitions?

A. Yes, sir; but, as an ore-carrier, it is a pipe-vein. A vein may have a dozen different names.

Q. Have you ever read of any other pipe-vein anywhere?

A. I have read of a good many of the Derbyshire and north of Ireland pipe-veins.

Q. Are there any in Derbyshire?

A. Certainly.

Q. What authors have you read who have spoken of pipe-veins?

A. I don't recollect their names.

Q. Where did you read about them?

A. I can't tell you.

Q. Can't you name the book that you read about it in?

A. I think De la Bache himself mentions it.

Q. In Derbyshire?
A. I think it is. It may be in Cumberland.
Q. Don't you know there is not a pipe-vein in Derbyshire?
A. I have never been there.
Q. Who is the author that describes ore there?
A. My familiarity with the shires of England is extremely small, and it may not have been Derbyshire that I was thinking of.
925 Q. You have read books upon this subject of pipe-veins, haven't you?
A. Not within several years.
Q. Have you read about any other prominent pipe-vein, any that you mentioned in the former trial?
A. I have not read again; but I mentioned two veins in South America. After giving that testimony I went to the Union mine, and there was a man there who showed me through that mine, who had been a miner in that vein; and I was particular to inquire of him as to its characteristics; and the description he gave me was, that the continuation of these ore-bodies was precisely like that of the Union mine. And I concluded, therefore, that I had been right in citing those as pipe-veins.
Q. In your former testimony did you mention the Acton mine?
A. I don't remember.
Q. Did you ever hear of such a mine as the Acton mine?
A. No, sir; I don't think I said Acton mine.
Q. What did you say?
A. I may have spoken of the Actonmoor district. The testimony is a monumental bungle.
Q. Were is the Actonmoor district?
A. My familiarity of the shires of England is very limited.
Q. You mentioned it a moment or two ago; tell me where it is.
A. I don't know.
Q. Do you know that there is such a district?
A. No, sir; I have not been there. When I mentioned it I mentioned it with a fresh memory of having read something about it. I cannot tell you where I studied it or where I mentioned it.
926 Q. I will read you some of your description of it.
A. That description of it is a monumental bungle. I have gone over that evidence myself, and I cannot see head nor tail to it. There are only a few points coherently reported. The first few pages I went over myself, and I am responsible for the manuscript of that. But the large part of the remainder I never had time to go over, and I recognize it as incorrect.
Q. You claim to be generally read in your profession on these matters that you have testified here to, to-day?
A. Not astonishingly.
Q. Haven't you read a good many books about pipe-veins and where they are found, and their characteristics?
A. No, sir.

Q. From what did you derive your information about pipe-veins?

A. From the general impression that one gets in his reading, without being able to definitely put his finger on his authority.

Q. Your authority is Jukes?

A. Jukes' quotation was the freshest in my mind.

Q. Did you, in your testimony in this case before, describe as a mine like the Richmond the Acton mine?

A. No, sir. I am misreported in that. I didn't describe any mine.

Q. Did you testify, "Oh, well, any other illustration you like to 'give? Ans. I will give an illustration of the Acton mine, in Der-'byshire, England?"

A. I probably got the name wrong. I have no memory now of any Acton mine.

Q. Did you describe any mine in Derbyshire, England, like this?

[Reads from testimony regarding Acton mine.]

927 A. I dare say that the greater part of that may be based upon fact, but I don't recognize it. Before that time I had been reading, and I had found a mine from which I gave that citation, I suppose. And imagination has supplied the details.

Q. The testimony which you gave on that former trial, you gave as an expert for the Richmond Mining Company of Nevada, defendant in this case?

A. Yes, sir.

Q. You testified in that trial before a jury?

A. Yes, sir.

Q. Do you know of a district anywhere in England called the Auctonmoor?

A. I have read of it.

Q. Is it the same as you meant now by Actonmoor?

A. I meant Austinmoor. The Acton mine is not in Austinmoor.

Q. What mine is?

A. I don't remember that.

Q. Did you ever hear of a mine called the Ecton mine?

A. Yes, sir; I think I have.

Q. Is that in Austinmoor?

[Here the court takes a recess until 2 o'clock P. M.]

AFTERNOON SESSION.

Cross-examination of CLARENCE KING—Resumed.

Mr. Thornton.—Q. I would like to ask one question about the Comstock which I omitted this morning. Do you know whether the various bodies of ore which have existed, or which now exist in the Comstock lode, lie immediately upon the foot wall?

A. As a rule, they did not.

928 Re-direct examination:

Mr. Wren.—Q. There have been many hundreds of feet of work done, have there not, since you testified in this case before, running in and toward grounds through which an ore connection would have to be made from the Champion to the Richmond?

A. Yes; many hundred feet.

Q. What is the hanging wall of the Emma mine?

A. Limestone; marbleized limestone.

Q. What is the foot wall?

A. The same.

Q. Then the Emma mine is situated in a zone of limestone?

A. It is.

Q. What is the size of the Emma mine?

A. I don't recollect exactly the dimensions; I think it runs down about 350 or 400 feet, through pipe, when it is cut off by a vertical fault, and explorations have not determined its further continuance.

Q. How long has it been since you read your book which you wrote "On the 40th Parallel Survey?"

A. I do not think I have looked at it for four years.

Q. Is it possible you may have forgotten some things contained in that book?

A. Not as to matters of principle; but some matters of detail, or the use of words, I may have.

Q. Do you recollect what you said about the chimneys of ore on the Comstock, in your book?

A. I do not recollect what I then said; but I know that I used the word "chimney," as relating to these openings in the lode, irrespective of ore, which are supposed to give vent to the material and permit it to come up from below.

929 Q. Vent to the ore?

A. Yes, sir; and vein material. The Comstock, in some places, closes together, so that the foot wall and hanging wall are in close contact. At these points, it is probable that material could not have arisen. I used the word "chimneys" to express those expansions of the lode, as a whole, in which the ore and gangue had arisen, if I recollect aright. As I say, I have not looked into the book for several years.

Q. Have you examined Von Cotta since the court took a recess?

A. I have glanced at a page or two of it.

Q. Does Von Cotta describe pipe-veins in Derbyshire?

A. He does; both pipe and rake-veins.

Q. Mr. Thornton, in assuming that he did not, was mistaken slightly, then?

Mr. Thornton.—I asked the question of Mr. King to find out what his knowledge was. I had a right to ask anything, in that view.

Witness—I had not looked at it at the time.

Mr. Thornton.—I was assuming it in order to find out whether Mr. King knew anything about it. I had a right to ask any question for that purpose.

Mr. Wren.—Q. Is there any description of pipe-veins in Jukes?

Witness—A. There is.

Q. Read the description that he gives.

Mr. Justice Field.—Has not that been read once already?

Mr. Thornton.—Yes; Mr. Wren read it.

Mr. Wren.—Then, if I read it, it is not necessary for Mr. King to read it now.

Mr. Thornton.—Mr. King went into an analysis of that, with reference to pipe-veins.

930 Witness.—I beg pardon. I did not.

Mr. Wren.—Well, if I read it that is all that is necessary.

Mr. Justice Field.—I presume there is no objection to its being read again. You may wish to ask him some question based on it.

Mr. Wren.—Then you may read that passage, Mr. King.

Witness [reading].—"A pipe-vein in the north of England is described by Westgarth Forster as, in many respects, resembling 'a huge, irregular cavern, pushing onward into the bed of the earth, in a slanting direction,' sometimes running between the beds, when those beds are highly inclined, and in other places 'bursting their way up through the strata.' One that I examined some years ago, with the late Mr. F. J. Foote, of the geological survey of Ireland, gives a good idea of these pipe-veins. It is a little west of Tulla, in the county of Clare, and showed an irregular, nearly vertical, descending chamber in the horizontal limestone, accessible by a winding path on its rocky sides, and in some places extending to a width of 50 or 60 feet. These sides are lined with a great deposit of crystals of calc-spar, which seems at one time to have filled up most of the cavity; and, I presume, contained masses of crystals of galena in sufficient quantity to render it profitable to extract the great mass of material which must have been removed. Other similar pipe-veins, and some true veins, occur in the neighborhood, and then such *pockets* of spar and ore are not of infrequent occurrence in many parts of the great limestone of the British Islands, which is known as carboniferous limestone." That is his description.

Q. Do you know what official position Jukes held?

931 A. Mr. Jukes was for a long time director of the geological survey of Ireland.

Q. You answered something in relation to sulphate of lead just before we took a recess. If you wish to explain anything in that connection, do so.

A. The question was, whether there was any white sulphate of lead in the mine. The question may have been put in a way which read, "Was there no white sulphate of lead in general?" There is

a white, crystallized sulphate of lead, but I have seen none in this mine. The sulphate to which I have alluded was a dark, galena-colored grey, which is very apt to occur in these oxidized mines. It is precisely similar to masses in the Union mine at Cerro Gordo, which I personally examined and found to consist of a little of the original sulphite, but chiefly sulphate.

Re-cross:

Mr. Thornton.—Q. Did you examine any of these crystals of the sulphate of lead?

A. In this mine?

Q. Yes.

A. I did not.

Q. Did you see any there?

A. I saw a great deal of and very little of carbonate of lead and molybdate of lead, but saw no sulphates.

Q. Were there none of those crystals there?

A. I saw none. I examined quite a number.

Q. What examination did you make, or assay, to find out what it was?

A. From this very great similarity I judged of its identity, the same as we determine by the eye any mineral which we are accustomed to.

Q. You only looked at it; you did not make any analysis?

932 A. I did not; but it has not the characteristic cleavage-planes of galena; those are lost.

Q. How does it occur in the mine?

A. It occurs in masses surrounded by the oxide ores or carbonate ores.

Q. Has it a metallic luster?

A. A quasi-metallic luster.

Q. Is it solid?

A. It is solid.

Q. Where did you make an examination of it? Where did you find it in the mine, in the first place?

A. I found it in a number of places. It usually is called galena.

Q. Where have you ever found it first? Where did you first know about it?

A. I first saw it in the Richmond works; in the old works.

Q. Did you ever see it in any other mine?

A. Oh, yes, sir.

Q. What examination have you made of that material, anywhere?

A. I have had it analyzed.

Q. Have you ever analyzed it yourself?

A. I have blow-piped it and had it analyzed. It is a hydrous sulphate.

Q. Can you tell, by analysis, whether it is a sulphate or sulphite?

A. Certainly you can.

Q. How? Describe the analysis and how you can tell it.

A. I cannot describe the analysis. I leave you to Proscenius, where we always look for methods of analysis as we go.

Q. Can you describe the process by which it is analyzed?

933 A. I cannot. As I tell you, we do not describe analysis. We take a "Proscenius' Hand-book of Analysis," and go through a regular course.

Q. First, you guess at a thing and then say the thing has been analyzed in some way by somebody else?

A. No. That is not my method at all.

Q. What is the method?

A. The method is this: I collect specimens which, by the eye, are identical. Those, on examination, prove to be largely sulphate, and to a very small extent sulphite. I assume from the identity of the appearance that it is the same thing, not having the characteristic cleavage-planes of the galena.

Direct examination:

R. RICKARD, sworn.

Mr. Wren.—Q. Did you locate the Arctic mining claim?

A. Yes; I did.

Q. Was that a copy of the location, as near as you can recollect? [Showing witness a paper.]

A. Yes, sir; this is a copy.

Q. Is that the mining claim represented on the map before you?

A. That is the one. The Arctic is here [showing].

Q. Did you post that notice on the ground?

A. I did.

Q. On what?

A. On a rock.

Q. Did you mark a monument, or mark out the borders on the claim?

A. Yes, sir.

Q. Had the ore-body of the Richmond been dicovered in

934 that ground when you discovered the location?

A. It was discovered.

Q. Had you declared your intention of becoming a citizen of the United States at the time?

A. I had.

Q. Was the location made at the time it bears date?

A. It was posted on the same day.

Mr. Wren.—The deed, I believe, is already in evidence.

Mr. Thornton.—If it is not, you can put it in, of course.

Mr. Wren.—It will be considered as in.

Q. Have you taken any specimens? Have you examined the

ground to the east of the shale that lies to the east of the Richmond, and east of Ruby Hill, the Jackson, and so on?

A. Yes, sir.

Q. Are there any mines situated in that limestone?

A. Yes, sir.

Q. Any of them immediately to the northeast of the Richmond?

A. Yes, sir; one or two.

Q. You have been engaged in mining all your life, haven't you?

A. Yes, sir.

Q. And are now superintendent of the Richmond?

A. Yes, sir.

Q. Have you ever bought ore from any of the claims situated in that belt of limestone to the northeast of the shale?

A. More from the Bowman claim.

Q. Do you know the Dunderberg and At Last?

A. Yes, sir.

Q. Do you know where the Hamburg is?

935 A. Yes, sir.

Q. Are these mines situated to the east of that belt of shale?

A. They are.

Q. Are they very important mines in that district?

A. Yes, sir.

Q. From which large amounts of ore have been taken?

A. They are second to the Eureka and the Richmond.

Q. Are there any mines of apparently low-grade ore located along in that zone of limestone?

A. There are several mines located there.

Cross-examination:

Mr. Thornton.—Q. The quartzite runs along Ruby Hill rather easterly, and easterly from the Richmond up to the Jackson, does it not?

A. Yes, sir.

Q. And then it runs down almost directly south at a right angle to that course, and runs on down towards Dunderberg, doesn't it?

A. Yes, sir.

Q. Does it make a turn to the Jackson?

A. It goes up Prospect mountain.

Q. How far is the Momon from the Jackson?

A. It is just past the Richmond, on the other side of the gulch.

Q. The Momon is?

A. Yes, sir.

Q. How far is the Dunderberg from the Jackson?

A. The Dunderberg from the Jackson must be a mile and a half or two miles.

Q. How far is the At Last from the Jackson?

A. It is at the same place.

936 Q. Did you name any other mine except those two and the Momon?

A. No, sir.

Q. Yes; the Hamburg. How far is the Hamburg from the Jackson?

A. The Hamburg from the Jackson must be two and a half or three miles.

Q. Now, look upon that surface map of Mr. Westcoat's. You see the quartzite on that side and then the limestone, where the Richmond mine is, and then the chrome which represents the shale, and then limestone beyond that. Now, where is the Momon mine situated with reference to that big body of shale represented by the chrome?

A. It is supposed to be situated on the side of the widest part.

Q. On that side of the widest part of the shale?

A. I do not think it is represented on the map.

Q. On which side is it; farther northeast?

A. I can hardly see the position from here.

Q. I would like for you to go over there and see if it is on that map?

A. The Momon mine? I don't think it is there.

Q. Can you point out on that map where it is?

A. I will see.

Q. How far is it from the Richmond?

A. From the Richmond? About half a mile; no, about 1,500 feet.

Q. Who is the owner of the Momon mine?

A. A. E. Titus.

Q. That you bought ore from?

A. Yes, sir.

Q. Does it lie in limestone, or in what?

A. In limestone.

937 Q. And it lies to the northeast of that body of shale, does it?

A. To the northeast of that body of shale.

Q. How is it worked? By what kind of machinery?

A. There is no machinery on it at all.

Q. What kind of an opening is there into it; tunnel, shaft, or what?

A. There is a shaft and an incline.

Q. What is the depth to which it is worked?

A. About 25 feet.

Q. How many tons of ore did you ever buy from the Momon?

A. I think we bought seven or eight tons of ore.

Q. And it is northeast from the Richmond shaft?

A. Yes, sir.

Q. And what distance from the Richmond shaft?

A. About 1,200 feet.

Q. Across the shale?
A. Yes, sir.
Q. Did you ever go into the mine?
A. I did.
Q. And it is as you have described it, a depth of 25 feet in working; and you bought five or six tons of ore from it?
A. Five or six tons of ore, may be six or seven.
Q. You stated just now it was, may be, half a mile off; are you estimating or guessing on the distance?
A. No; I corrected myself.
Q. Did you ever measure it?
A. No, sir; I didn't.
Q. When were you last in that mine?
A. About a month since.
Q. About a month ago?
A. Yes, sir.
938 Q. Were they working it then?
A. No, sir.
Q. How long was it since they had worked it?
A. About three or four months.
Q. Do you know when the location was made? How old a mine it is?
A. I don't.
Q. You don't know anything about it?
A. No, sir.
Q. They had not worked it for four months when you were there last?
A. They hadn't worked for three or four months.
Q. Was there any more ore in it?
A. A little ore on the surface—a little ore on the ground, but not much.

Mr. Wren.—What was the assayed value of the ore?
A. They smelted some that assayed $120; I think the two lots we bought assayed $118 or $120.
Mr. Justice Field.—I do not understand whether the witness said he was naturalized, or simply declared his intention.
Mr. Wrea.—He declared his intentiou.
Mr. Justice Field.—How long ago?
Witness.—About six years ago.

Q. Before you made the location?
A. Oh, yes, sir.

Testimony of A. E. TITUS:

Mr. Wren.—Q. Are you the owner of the Bowman mine?
A. I am.
Q. How far is that mine from the Richmond?
A. About 2,000 feet.

Q. Have you taken any ore out of it?

A. I have.

939 Q. What was the assay value returned to you by the ore?

A. From $120 to about $138 or $139.

Q. Do you know what the assay value was?

A. That is, as I have told you, between $120 and $138.

Q. That is immediately north of the shale that lies to the northeast of the Richmond?

A. Yes, sir.

Q. Do you know where the Hamburg and Dunderberg mines are, and the At Last?

A. I do.

Q. Are they valuable mines?

A. They are.

Q. Do they lie to the east of that belt of shale, or to the west of it?

A. To the east of that.

Q. Do you know of any mine just to the east of the Jackson that have been any prospects?

A. I do not.

Q. You did not examine any along there?

A. No, sir.

Cross-examination:

Mr. Thornton.—Q. When was the Bowman mine located?

A. It was located as the Bowman mine a year ago this month.

Q. What was the old location before it was re-located?

A. I don't know the name of the old location. I knew the parties that owned it.

Q. Well, they had abandoned it, and you re-located it about a year ago?

A. Yes, sir.

940 Q. How deep was that shaft when they abandoned it?

A. About three feet.

Q. How deep?

A. About two or three feet.

Q. And you sunk it farther to a depth of twenty-five feet?

A. Yes, sir.

Q. Is it down in the bottom of the ravine, or is it still on the hillside?

A. It is on the hillside.

Q. Near the ravine?

A. No, sir; considerable to the east of the ravine.

Q. Is it across the ravine from the Richmond?

A. Yes, sir.

Q. You go down the hill from the Richmond to the bottom of the ravine, and then it is on the opposite side?

A. Yes, sir.

Q. What is that called?

A. I don't know really what it is called. It is neither Adams Hill nor Ruby Hill. It is on a spur.

Q. A kind of a spur of the Adams Hill?

A. Yes, sir.

Q. The Adams Hill is the hill that has mines on it that is still farther to the north?

A. Farther to the north.

Q. And you think this mine is in on a spur of that Adams Hill?

A. It might be. This is a continuation of the hill that runs down just east of the K. K.

Q. Could you draw a diagram of where these mines are; the Hamburg and Dunderberg are situated in that district?

A. Yes, sir.

941 Q. Can you show, by a diagram, where these mines are?

A. I don't know as I could.

Q. I want to see how they are situated, with reference to their direction from these other mines.

A. I will show you the direction as well as I can.

Q. Suppose that to be Ruby Hill [pointing and exhibiting papers], there is the Eureka, there is the K. K., the Phœnix, the Jackson. Now, would the Hamburg and Phœnix be about at that angle? Supposing that the quartzite runs off there [pointing], this is the Eureka, here is the K. K., the Jackson. Does the quartzite and hill turn around and run along directly at right angles here?

A. Very near; not quite. It has more a curve, that running at right angles; but pretty near at right angles [examining].

Q. At what distance is that from the Jackson, on the ground?

A. The surface of the ground, the Hamburg is about two miles from the Jackson.

Q. How far is the Dunderberg and the At Last?

A. The Dunderberg and At Last are adjoining mines. They are, in fact, one mine. The Dunderberg is the west, or to the north of the Hamburg. I should judge a quarter of a mile, probably more. Somewhere in that neighborhood.

Testimony of Jos. E. Potts:

Mr. Wren—Q. Do you know where the Bowman mine is?

A. I do.

Q. Do you know the zone of limestone that lies immediately east of the shaft that lies northeast of the Richmond mine?

942 A. Yes, sir.

Q. Do you know of any mines located in that zone of limestone for 2 or 3 miles to the south, commencing with the Bowman?

A. I know quite a number of them, but I don't remember the names south and southeast.

Q. Do you know the Bowman and the Luckyman and the Savage?

A. Yes, sir. To the southeast of the junction on that hill there is a number of mines. I could not say how many. I don't remember the names. I believe the At Last is a mile and a half to the south.

Q. Do you know where the Dunderberg and the Hamburg are?

A. Yes, sir.

Q. Are those prominent mines in the district?

A. They are.

Q. An average amount of ore produced from them?

A. Yes, sir; I think there has been, for the amount of work done.

Q. Is the Dunderberg and Hamburg to the east of the shale running past the Jackson; to the southeast?

A. Yes, sir; they are.

Q. To the east of it?

A. Yes, sir.

Q. Are the Hoosac mines to the east of them?

A. Yes, sir.

Q. The Hoosac mines are in the quartzite?

A. Yes, sir.

Q. That is, in the quartzite that runs to the east?

A. Yes, sir.

Cross-examination of Jos. E. POTTS:

Mr. Thornton.—Q. The Hoosac mine is in a belt of quartzite to the northeast?

943 A. Yes, sir.

Q. How far distant?

A. About three miles south of Ruby Hill. On a straight line about three miles south of Ruby Hill.

Q. Did I understand you to say that there was any other mine near the Jackson and K. K., and Phœnix and Richmond, that has been worked and has yielded any ore, within a mile?

A. Yes, sir.

Q. What is the mine?

A. The Bowman.

Q. Is that the only one you can name?

A. There was another one there, but the name of it I do not remember. It had 50 tons, I should think, of ore on the dump.

Q. What is the name?

A. The name? I do not know.

Q. Where is it?

A. About 1,000 or 1,500 feet east of the Jackson.

Q. Across the shale from the Jackson?

A. On the east side of the ridge on the knoll.

Q. If Prospect mountain was to run down straight instead of being twisted around where it is, that would be a continuation of Prospect mountain, would it not? That would be one spur of Prospect mountain?

A. Yes, sir.
Q. What is the name of that mine?
A. I don't know the name.
Q. Has it got any name to it?
A. I suppose it has.
Q. You don't know how deep are the workings on it?
A. They have one shaft down 50 or 60 feet.
Q. Have you ever been down it?
A. I looked down it.
944 Q. How many tons of ore was there on the surface?
A. About 50.
Q. How often have you seen it?
A. I have seen it a number of times. I have tried to find out who was the owner of it, and never could.
Q. When did you first see it?
A. I first saw it about a year ago.
Q. Then it was just as it is now?
A. Yes, sir; just as it is now. No other working done on it. There was a pipe and lead to blow air down the shaft.
Q. And you never could find out who owned it or worked it, or knew anything about it?
A. The only thing I could find out about it was that it belonged to a Frenchman, and he left the country.
Q. What kind of ore was that on the dump? What was it worth?
A. I don't know what kind it was. It looked very well. Yellow carbonate ore.
Q. Was it worth working?
A. I think so.
Q. If it was worth working, the Frenchman would probably have sold it?
A. Well, it looked very well.
Q. How long have you seen it there?
A. For a year.
Q. You went there about a year ago?
A. Yes, sir.
Q. And you found it there when you first went to the district?
A. Yes, sir.

945 WILLIAM DOOLAN, sworn.

Mr. Wren.—Q. Have you ever traced quartzite from Jackson, going south?
A. I have.
Q. How far?
A. Well, I should judge between two and three miles; probably not quite so far. I am not definite about that.
Q. Have you traced the shale, going south?
A. Yes, sir.

Q. On which side of the shale that appears at the Richmond and Jackson, to the northeast, and passes to the south, is the Dunderberg mine situated?

A. I did not go clear to the Dunderberg mine.

Q. You did not see the Dunderberg mine?

A. I could see it, and it appeared to the east of the shale.

Q. You could see it and it appeared to the east of the shale.

A. I should judge it to be.

Cross-examination:

Mr. Thornton.—Q. Were you down in the workings of the Dunderberg?

A. No, sir.

Q. Can you tell whether the foot wall is shale or quartzite?

A. No, sir; of course not.

Q. Then you cannot tell what the hanging wall is?

A. Of course not. I simply said that I was not there. I did not even go there.

Q. You did not even go there?

A. No, sir.

946 Testimony of WM. H. DAVIS:

Mr. Wren.—Q. Have you ever traced the quartzite that appears just west of the Jackson mine, and the shale just east of south of that mine?

A. Yes, sir.

Q. How far?

A. I should judge about a mile and a half in a straight line?

Q. Which side of the shale is the Dunderberg mine?

A. I never was over at the Dunderberg.

Q. Could you see those where you were on the shale?

A. Well, I had it pointed out to me, to the left of the shale; that is, northeast.

Cross-examination:

Mr. Thornton.—That is, you had pointed out to you the hoisting works of a mine called the Dunderberg?

A. Yes, sir.

Q. You do not know what it passed through. You don't know what the shaft passed through. You don't know whether it passed through shales or through quartzite, dip end or not?

A. I do not.

HENRY WILLIAMS sworn.

Mr. Wren.—Q. You are a miner, are you?

A. Yes, sir.

Q. Do you know where the Bowman mine is?

A. No, sir; I do not.

Q. Have you examined the zone of limestone lying immediately northeast of the shale that runs to the northeast of the Richmond, Jackson, and those other mines?

947 A. I have.

Q. Did you find any mines in that zone of limestone?

A. Yes, sir.

Q. How many?

A. Well, I don't know; I have seen several mines there?

Q. Did you see any just to the northeast of the Jackson, or east of the Jackson?

A. Oh, yes.

Q. Do you know how many there are there?

A. No; I do not.

Q. Do you know where the Dunderberg and the Hamburg are?

A. I have been in that vicinity, and have seen the dumps.

Q. Do you know whether they are to the east of that belt of shale, or not?

A. Yes, sir; they are to the east.

Cross-examination:

Mr. Thornton.—Q. The Dunderberg, you spoke of?

A. Yes, sir.

Q. How far is it from the Jackson?

A. I don't know the distance.

Q. How many miles? Estimate.

A. I should say two miles, probably.

Q. It is south of the Jackson, is it?

A. South of the Jackson.

Q. And on Prospect mountain?

A. I cannot say as to that.

Q. Do you know what is called Prospect mountain?

A. I never was over Prospect mountain.

948 Q. Did you ever go through the workings of the Dunderberg?

A. Never.

Q. Do you know whether the workings of that mine are between quartzite and shale, or not?

A. The workings of what mine?

Q. Of the Dunderberg.

A. I do not.

Q. Can you tell whether the foot wall of the Dunderberg is quartzite?

A. I cannot.

Q. Can you tell whether the hanging wall is shale, or not?

A. No, sir.

Q. You spoke something about some mines being near the Jackson. What mine is near the Jackson?

A. I don't know the name of any mine near the Jackson. I don't know the names of them, but I know there are mines there.

Q. You know there are mines there, but you don't know their names?

A. I don't.

Q. How are they worked?

A. Worked by shafts.

Q. What kind of machinery is there over there?

A. I saw no machinery.

Q. How deep is the shaft on any one mine?

A. I cannot say as to that.

Q. You never saw the shafts?

A. I have seen the shafts but don't know how deep they are.

Q. You cannot tell how deep they are?

A. No, sir.

Q. Could you see to the bottom of them?

A. Yes, sir. They vary from a few feet to more.

949 Q. Did you see any ore in any of the mines?

A. Yes, sir.

Q. In what mines?

A. I don't know the names of them.

Q. How long is it since any work has been done *in* those mines?

A. I could not say.

Q. How long have you been in that district?

A. A year and a half.

Q. Have you ever seen a man at work on any of them since you have been there?

A. I don't remember seeing any one at work on them.

Q. How far are they from the Jackson?

A. They may be half a mile. They are different distances.

Q. They are prospecting holes that have been abandoned, are they not?

A. I do not know of their being abandoned. I don't think they are abandoned.

Q. You have not seen them worked on for over a year and a half, have you?

A. I have not been there but a very few times.

Q. On what hill are they, a continuation of Prospect mountain?

A. I could not say what the hills are called. I suppose there are some local names for them, but I don't know the names.

Q. They are not on Ruby Hill?

A. Not on what I understand to be Ruby Hill proper.

Re-direct examination:

Mr. Wren.—Q. Have you traced the quartzite from the Jackson, on the south?

950 A. I have.

Q. On which side of this belt of shale did you find the quartzite, going south?

A. I found it on the east side.

Q. Do you understand my question?
A. I think I do.
Q. What was it?
A. You asked me which side of the shale I found the quartzite, going south.
Q. Yes, sir; that is what I asked you.
A. Excuse me; it is on the west side.
Q. How far did you trace it south?
A. I traced it for quite a long distance; probably two miles.
Q. What becomes of the quartzite?
A. As you go down into the ravine it dips below the surface.
Q. You did not see it any further?
A. No, sir; no further.

THOMAS PRICE, sworn.

Mr. Wren.—Q. Did you take any samples for assay from the winze, from the body at the end of the 5th level of the Eureka, down to the 9th level?
A. Yes, sir.
Q. Just give the points from where you took samples; their assay in value.
A. I went down in the 5th level. I entered the winze of the Eureka, along the 5th level, and reaching point 57.

Mr. Thornton.—Q. Point 57 on Exhibit 1?
A. On this map?
Mr. Thornton.—Yes, sir; that map; Exhibit 1.
A. Yes, sir. I came along until I came to a point further
951 down the winze at 57; down which I also passed to the cave. I took a sample there, 49 feet from the 7th level. I found ore there assaying $1.68 a ton.
Mr. Thornton.—Q. That is down the winze from point 57?
A. Yes, sir.
Q. Forty-nine feet below the 7th level?
A. *Above* the 7th level. I wish to correct myself and say on the the 6th level, at 69 F. On the 6th level. I went down there for a distance of about 50 feet in ore. At that point the connection was doubtful. And I took an average sample for the distance of 10 feet and obtained an assay, already enumerated, namely, $1.68 in silver and a trace of gold. I then continued for 10 feet lower, and I made an average sample for the whole distance of 10 feet, and obtained and assay of $5.43 in silver and traces of gold. I followed down again on the same winze, for a farther entire 10 feet, and obtained a sample, giving only traces of gold and silver. I followed down another 10 feet and obtained an assay of only traces of gold and silver. The next 9 feet was thoroughly sampled, which brings us down to the 7th level. At 79 G I found an assay there of $6.50 in silver and $2.07 in gold, making a total of $8.57. On the 7th

level I took a sample along the line going along the level for some distance, to the next winze down, and I observed there a close contact between the quartzite and the limestone——

Mr. Thornton.—[Interrupting.] Well, if the court please, I did not know that the witness was going into the facts in regard to this matter.

Mr. Price.—Excuse me; I was only going to give the marks; excuse me. I found only traces there. The next ten feet on the level, going towards the next winze down there, gave only traces again. The
952 next 10 feet only traces. The balance of this drift connects with the winze going down to the 8th level. At that point, which is point 79 B, I got only traces. I now pass down into the winze near 79 B, towards the 8th level, into ore where is the point marked 89 C on the map. I will say that at that point, and along here, these samples—again as before—represent average samples for each ten feet along the course of the winze. The first ten feet in the winze down there give no traces of gold and silver. The next ten feet give traces. The next ten feet give traces. The following ten feet give $2.32 in gold and silver. The following ten feet give only traces. The following ten feet give $1.03 in gold and $1.94 in silver. The next ten feet give only traces of gold and silver. The next ten feet gives only traces of gold and silver. The next ten feet gives $6.50 in silver and 82 cents in gold, making a total of $7.32. The following ten feet give $11.12 in silver and $11.94 in gold. The next ten feet gave an average of $3.62 in silver and $2.06 in gold, making a total of $5.68. The next thirteen feet—which is the terminus of this winze, downward—gave only traces of gold and silver. On this winze I went down on the contact.

Mr. Wren.—Q. Did you ever have any assay and obtain $11 in silver and $11 in gold?

A. No, sir.

Q. I understand you so to read one.

A. I should give $11.12 in silver and 82 cents in gold, making a total of $11.94. I give the samples as I took them. I now commence were I left off before, near 89 C. At the cross-cut there, going toward the cave, and I followed in the direction of the Richmond, northerly, along the course of this level. This is
953 the 8th level. The next 10 feet from the bottom of the winze, where my last sample was taken from, gave me one hundred and twenty. The sample for 10 feet here gave $1.55 in silver and $2.06 in gold, making a total of $3.61. The next sample, which is No. 129, the whole drift, I observed was in quartzite, nothing but quartzite. An average sample of the quartzite for 10 feet gives $2.72 in silver and $4.13 in gold, making a total of $6.85.

Mr Thornton.—Q. In what drift is that?

A. It is in the drift near 89 C. There is where I commenced.

[Pointing.] Right at the point where you see quartzite intersecting the drift. There is where I noticed the quartzite crossing the line. Sample 130 was taken for 10 feet further, in the direction of the Richmond; still in quartzite. That gives $15.77 in silver and $6.20 in gold, making a total of $21.97. The next 10 feet again, I find the drift still in quartzite, that gives 90 cents in silver and $2.06 in gold, making a total of $2.96. The next sample was a sample taken in the same direction of the other 10 feet, the drift being driven on the contact between the quartzite and the lime, giving me only traces of gold and silver. The next sample was taken 10 feet still further on, showing only traces of gold and silver. I followed 10 feet in, with like results. And so is the next 10 feet. And the next 10 feet I followed without a trace of either gold or silver—the drift now being a contact of the quartzite and lime. The last 10 feet, ending at the end of this drift, at point 89 E, where there is a winze up, going towards the 7th level, and no connection having been made at the time I was there, shows only a trace of gold and silver. No; excuse me; a trace only of silver, and $2.32 in gold. There is a good deal of irony matter in it.

954 Mr. Wren.—Did you make any analysis——

A. [Interrupting.] I have not finished yet.

Mr. Wren.—Oh! You have not finished yet?

A. No, sir. My next sample comes from the point commencing at the winze on the eighth level, marked 89 F on the map. The first I took a sample for analysis, commencing at 89 F, and from that, between 89 F and 89 D on the map, going down towards the cave for a distance of seven feet, and obtained only traces of gold and silver. Ten feet downwards, towards the cave, there was only traces of gold and silver; and for another ten feet only traces. Following the next ten feet, only traces. And the remaining ten feet, at which point I entered the floor of the cave, or what appears to be the floor, I found only traces of gold and silver. I then went along a drift running from the foot of this winze towards the cave; a sample that I obtained there gave only traces of gold and silver. I also obtained a sample of very ferruginous matter in the roof of the cave; and I obtained from that only traces of gold and silver.

Q. Did you make any analysis of what is called the clay in the in the Bell-shaft tunnel?

A. I did, sir.

Q. What was the result of that analysis.

A. Clay in the Bell-shaft tunnel, so-called; 69.92 per cent. carbonate of lime, 1.96 per cent. carbonate of magnesia, 5.82 per cent. carbonate of iron, traces of alumina, 24.81 per cent. of silica and silicate of alumina.

Q. Did you make an analysis of any of the shale found at the 7th level of the Richmond?

A. Yes, sir.

Q. What is the result of that analysis?

955 A. The result of that analysis is this: carbonate of lime 10.29 per cent., magnesia 75 per cent., carbonate of iron 6.09 per cent., and 82.21 per cent. of silica and silicate of alumina.

Q. Did you analyze any shale?

A. Yes, sir; I analyzed some shale on the face of the 800-feet level of the Richmond.

Q. What was the result of that analysis?

A. 26.12 per cent. of carbonate of magnesia, 17.5 per cent. of carbonate of iron, traces of alumina, 45.5 of silica and silicate of alumina.

Q. Did you analyze any from the K. K?

A. No, sir.

Cross-examination:

Mr. Thornton.—I want you, Professor, to look at this. There are a great many analyses on the same page which the witness has not been asked about.

Mr. Wren.—They are analyses of limestone, that I did not suppose it was of any consequence to ask him about.

Mr. Thornton.—How much——

Mr. Wren [interrupting].—I will ask him about them if you wish me to do so.

Mr. Thornton [continuing].—How much carbonate of magnesia on the last analysis which you read?

Mr. Wren.—I can have him read those over if you wish.

The Witness.—One and five-hundredths per cent.

Mr. Thornton.—Look at that report of assays in the winze from 79 A, down from the top of winze 79 A, down from the 7th to 8th. I want you to tell me what there is in the yield for the first 40 feet down.

A. My recollection is that it yields nothing.

956 Q. From 79 A, the winze from the seventh to eighth, for the first 30 feet down, what do find?

A. Traces only.

Q. For the first 40 feet?

A. Three samples, representing the first 30 feet downward, gave me only traces. The next ten feet gave 1.29 in silver and 1.03 in gold, making a total of 2.32.

Mr. Thornton.—Q. What would the lumps of galena found in that mine, or these mines, generally assay?

A. I found that the galena is very uniform with respect to its possession of gold and silver. I have seen some that would assay from $50 to $60 in silver, and $12 or $15 or $20 in gold, and I have seen some go up to $32 in silver and $100 in gold.

Q. You state that as the lowest and highest?

A. I state those as specimens which I remember.

Q. Will you state the processes through which you went to make the analyses of the shale?

A. Yes, sir.

Q. Describe the process; the chemical processes.

A. Premising my statement, first of all, before giving the mode of analysis, with the statement that the material was dried of the quantity of water, without estimating the quantity of water. From the fact that the samples taken from the position in which they were in the vein were dried somewhat by the transportation, a fact which any analytical chemist will understand and appreciate; so I had it dried before commencing the analysis, before the analysis.

Q. How did you dry it?

A. In the water bath; I put it in an oil bath of about 10 degrees above the temperature of boiling water.

957 Q. Was that the case with all three samples?

A. Yes, sir; I did that invariably; I dried it to get rid of the water before commencing the analysis, premising with the remark that I could not give an exact analysis as it was taken from the vein, for it was necessary that I should bring it down here for examination.

Q. Now, go ahead with the process after drying it.

A. I digested it for about an hour; I weighed out given quantities. I do not suppose you want me to give the quantities. If you do, I shall have to refer to my note-book.

Mr. Thornton.—Q. About how much?

A. Just about two grammes. First, I applied myself to reduce a certain quantity to an impalpable powder in an agate mortar. A definite quantity of about two grammes was dissolved in concentrated muriatic acid, pure—chemically pure. I vaporated that to dryness, moistened the residue with muriatic acid, and added a certain quantity of water, and boiled again. Filtered, in order to remove the dissolved portion from the undissolved, and repeated the process of digestion with muriatic acid, in order to be sure and remove all possible quantities of substances that may have been dissolved by the muriatic acid. I have now separated it. I have got a soluble and unsoluble matter to deal with. We, laying aside for the time being the unsoluble portion for further investigation, the muriatic acid, without solution was concentrated somewhat. Nitrate acid was added, and the whole solution boiled for some time after this digestion. I added a solution of ammonia, which threw down from the solution what alumini and iron there was, and

958 probably a small quantity of lime and magnesia. This precipitate was then re-dissolved in muriatic acid, and re-precipitated in order to remove any portion of the lime and magnesia that might have fallen down with it.

Q. State generally how you went on to obtain results. Such a description as chemists generally give.

A. Well, I have just listened to a very sharp cross-examination, and I am very careful not to have any little point misunderstood.

Mr. Thornton.—Well, we do not purpose any such ordeal for you, Professor. Just state generally how you do it.

A. That precipitate, containing the iron and alumini and lime, was wet. And another analysis was carried on precisely the same as I have told you now; and I determined the iron by the permanganite of potash, in order to know the difference between the alumini and the iron it may have contained; getting at the one directly and at the other indirectly. By that I obtained, of course, a certain percentage of iron and alumini. My ammoniacal solutions are now supposed to contain practically only the lime and the magnesia, and probably the alkali vapors. I did not examine every thing, because I did not deem it necessary for this investigation. To the ammoniacal solution I added acid oxalate of ammonia, in order to precipitate my lime. I have now thrown down my lime in my magnesia. This oxalate of lime was re-dissolved in order to remove the last traces of magnesia that might possibly have been brought down with it. Finally, I converted my oxalate into carbonate, with all the care that analytical chemists are generally supposed to do. I then took this solution from the oxalate of ammonia and concentrated it some, and precipitated my magnesia by means of
959 phosphate of soda, and obtained mechanical phosphate of magnesia, which I filtered, dried, nitred, and converted it into pyro-phosphate, from which I converted it into carbonate.

Q. What did you do with the first insoluble residue?

A. I subjected that to qualitative analysis; wet it first of all, and fused that with carbonate of soda and carbonate of potash and separated it by the usual methods known to chemists, which it is not necessary for me to go through, as you say.

Q. No; it is not necessary.

A. I then determined the alumini and then assumed the balance to be silica, and found there was a little excess of silica—not much, one or two per cent.—and finally called it silica and silica silicate of alumini.

Mr. Wren.—I now offer in evidence the certified copy of the notice of location of the Richmond lode, for the purpose of showing that the lode was located prior to the passage of the law of Congress of 1872.

Mr. Heydenfeldt.—We object.

Justice Field.—Your patent was issued under the law of 1872.

Mr. Wren.—The patent recites all three of the laws, the law of 1866, the law of 1870, and the law of 1872. It was granted, however, after the passage of the law of 1872.

Mr. Wilson.—We suggest, so far as any objection is concerned, that it would be hard for us to meet an objection now and answer it without an argument of the entire law, which we, of course, can

make at the proper time. If the evidence could be taken, subject to the objection, your Honors can retain it or rule it out, according to your views, after a general examination of the law.

Mr. Heydenfeldt.—I am inclined to think, if your Honors
960 please, that this is, possibly, the only question in this case, and the consideration of it now may save a great deal of the time of the court and the labor of counsel. Therefore it seems to me that unless the court desires otherwise, it would be best to hear argument on that question now fully. In my opinion, the decision of this question will probably terminate the case.

Mr. Wilson.—We can argue the matter now, but as the whole case may turn upon it, we should probably take a day to discuss it. It seems to me it is very much better to admit the evidence, subject to objection. There are but very few other witnesses to be examined.

Mr. Heydenfeldt.—I do not know how many witnesses the gentlemen may have to examine hereafter. I know, as a matter of course, that in a case involving the geological mysteries which have been expanded before the court, there must be something in rebuttal; and it may consume two or three days more; and as, according to my judgment, this is the only thing that is in the case, and the geological problems have nothing at all to do with it, I think we might as well begin and end the case right here.

[The court decided that the argument on the objection should be deferred until after the close of the testimony, and that at that time the grounds of the objection should be stated. The testimony offered was received subject to the objection.]

Mr. Wren.—We also offer in evidence a certified copy of the application of the Richmond Mining Company for a patent; also the ledge location of the Champion.

Mr. Wilson.—The date of the Richmond location is on the 20th of September, 1869.

Mr. Wren.—I also offer in evidence a certified copy of the
961 notice of location of the Lookout ground; and also a certified copy of the application of the Eureka Mining Company for a patent to that ground. We put in the Tip-Top also, the notice of location, and application for a patent.

Mr. Heydenfeldt.—This is all taken subject to the objection, of course.

Mr. Thornton.—Or any objection.

Mr. Wren.—Now, we have but one other witness, Mr. Westcoat, and Mr. Thornton will permit him to write out a written statement of the courses of the Richmond fissure, so called by us, and of the quartzite within certain limits, and hand that to the gentlemen on the other side, and they will receive that instead of putting us to the trouble of putting him on the stand.

Mr. Thornton.—If it becomes necessary, we would like to cross-examine him.

Mr. Wren.—Yes, if it becomes necessary to cross-examine him you can, but I presume the maps and the model will show that his list is correct.

Justice Field.—I want to ask you one question. When you rested on the part of the plaintiff you asked defendant's counsel if they admitted that the defendant was in possession at the time the suit was commenced. Then Mr. Wren asked you, as I see it recorded here, "you also admit that you were in possession?"

Mr. Thornton.—That was an inaccuracy.

Justice Field.—Now, I want to know what that means; whether both of you are in possession of portions of this ground.

Mr. Thornton.—That is it. We were in possession of that which is shown on the various maps within our drifts and works, and they were in possession of that portion of the Potts chamber on
962 our side of the line as charged in the complaint, and the 6th and 7th levels, and so forth, run from their shaft. Our possessions were separate and distinct from each other.

Justice Field.—The ground in dispute was not all in the possession of the defendant?

Mr. Wren.—No, sir.

Justice Field.—Part was in the possession of the plaintiff?

Mr. Wren.—Yes, sir.

Justice Field.—Will you point out?

Mr. Wren.—Well, I stated at the time the admissions were made that the defendant would admit that it was in possession of that portion of the premises described in the plaintiff's complaint, and the plaintiff admitted it was in possession of that portion of the premises that was described in the cross-bill.

Justice Field.—That is sufficient, then. That is understood.

[Defendant here rested.]

[Court adjourned until to-morrow morning at half-past ten o'clock.]

963 TENTH DAY.

FRIDAY, *August* 3, 1877.

Judge Sawyer.—Is Mr. King in court? Mr. King, I would like to have you take the stand again. I desire to ask you a few questions. It may afford us some aid in the construction of the act to learn in regard to lodes of cinnabar as well as silver and gold. I would like to ask Mr. King if he is familiar with lodes of cinnabar.

Mr. King.—I am not, sir.

Judge Sawyer.—You do not know how they are located?

Mr. King.—I am not familiar.

Judge Sawyer.—Mr. Ashburner, can you tell us?

Mr. Ashburner.—Professor Whitney is more familiar with that subject than I am, sir. He has made a special examination of that.

Judge Sawyer.—I would like to ask Mr. Whitney, then.

J. D. WHITNEY recalled.

Judge Sawyer.—I would like to have you state how cinnabar is found, in what condition, how it compares with lodes of silver and gold.

A. Cinnabar is a very volatile metal. It is found in more irregular deposits than any other ore-metal known. It never, so far as I know, occurs in regular lodes, on account of its great volatility.

964 Deposits of cinnabar are exceedingly irregular, and more so in California than any other part of the world. At the New Idria mine, for instance, one of the most irregular deposits I have ever known.

Q. Is it ever found, or usually found, in regular fissure-veins?

A. No, sir; I think not. Never. I know of no quicksilver mine in the world which is worked on a regular fissure-vein.

Judge Hillyer.—Q. Does it occur in any kind of deposit there?

A. Not so far as I know. It ramifies through the rocks in every direction. There are large masses which are comparatively pure met with occasionally, but they are not connected together regularly with each other. As I say, they come under the head of irregular deposits.

Judge Sawyer.—How is it with tin ore?

A. Tin ore is found in lodes usually. Some of the principal mines of Germany are in stock-work deposits; but the mines of England are usually in well-defined veins; in the same veins in which copper mines occur. They were worked first as tin mines and afterwards as copper, and then at great depth yielding tin, when worked down to the depth of two thousand feet or more.

Q. How is it with copper?

965 A. Copper occurs in every form possible. Copper mines are worked in every kind of deposit on regular veins, irregular deposits, and impregnations. In fact, there is no form of mineral deposit in which copper does not occur.

Mr. Thornton.—I want to ask Mr. Hague one question as further cross-examination before the other side closes.

J. D. HAGUE recalled for further cross-examination.

Mr. Thornton.—Q. I would like to have you write on the map the letters showing the points from which you measured that fissure-plane that Judge Sawyer asked you about the other day. [Showing map.] Just show that, the 6th level, where you measured that 600 feet.

A. At point 67, near point 69, between 69 and the shaft, but nearer to 69, and under the tracing of ore shown on map, and on

the 6th level, in a new work west of the shaft. I cannot say precisely how many feet, but I should think 80 to 100 feet.

Mr. Thornton.—If the court please, a great many books have been referred to on geological and mining subjects, and I would like to inquire of the court, and of the counsel on the other side, if they may be read from and used in the argument and considered by the court.

Mr. Hillhouse.—Those that are offered.

Mr. Thornton.—Do we have to offer them specially?

Mr. Hillhouse.—I think they ought to be offered.

Mr. Thornton.—Mr. Wren has asked questions about a great many which he has not offered.

966 Justice Field.—I suppose if you prove the work is one of established reputation you can read it for the information of the court.

Mr. Thornton.—That is the rule.

Justice Field.—But in order to do that, you have first to lay the foundation by showing that it is a work of established reputation, and an acknowledged authority on the science.

Mr. Thornton.—The court has declared the rule exactly as it is.

Justice Field.—No objection is taken, I understand; but if any objection be taken, you had better make proof of the character of the book. However, I take it there will be no necessity to do that.

Mr. Wilson.—There will probably be no objection. I think there will be no difficulty about it. Mr. Wren is out and will be in in a few minutes, and may have something to say on the subject.

Mr. Thornton.—Then, if the court please, while Mr. Wren is absent, I offer in evidence in rebuttal a deed of the Eureka Consolidated Mining Company to the Richmond Mining Company; not the defendant in this action, though. It is dated the 26th of April, 1871.

Justice Field.—Take it subject to objection.

Mr. Thornton.—It is the triangular deed.

Mr. Lansing.—The deed of 1871.

967 Mr. Thornton.—I would like to ask Mr. Westcoat one question as to a matter about which I think he made a mistake in calculation.

N. Westcoat recalled.

Mr. Thornton.—Q. You were asked what proportion of limestone in comparison with ore there was between the quartzite and the shale, and you made a calculation, as you said, from the first of those glasses. Did you include the entire glass?

A. I did.

Q. And not simply that portion of it which was between the red line, which represents the quartzite, and the blue line, which represents the shale?

A. I included the whole plate.

Q. Well, was that the question to you?

A. That was the question, as I understood it. I may not have understood it properly.

Q. Well, the object is to come at the proportion between the two formations, the quartzite and the shale. Can you make a calculation for us?

A. I have since made a calculation with Mr. Read, and I find it is about two hundred to one.

Mr. Thornton.—That is all that we propose to produce, after this deed is passed upon.

Mr. Lansing.—We object to that deed as irrelevant and
968 incompetent. It was a deed in 1871, since which time there have been other deeds between the parties covering the same ground, which are in evidence already. And it is not rebutting evidence.

Justice Field.—We will take it subject to the objection, and if afterwards we find the objection ought to be sustained, we will rule it out.

Mr. Heydenfeldt.—I am willing the court should receive it subject to all objections except that it is not in rebuttal; because, even if it were not in rebuttal, by leave of the court we could introduce it, and we ask that leave.

Justice Field.—No objection to that.

Mr. Lansing.—Then it will be taken subject to the other objections.

Mr. Thornton.—We rest.

Mr. Wren.—I would like to have the gentlemen admit in connection with their offer of the deed to the triangular piece first made to the Richmond Mining Company, that that was to one of the predecessors in interest of the present company; in other words, that the present Richmond company have whatever title was conveyed to the triangular piece.

Mr. Wilson.—The grantee in that deed not being the
969 present defendant.

Mr. Wren.—The grantee in that deed is not the present defendant, but another Richmond Mining Company of Nevada.

Mr. Thornton.—That I stated.

Mr. Wilson.—Well, unless that is so, it is utterly irrelevant to the case.

Mr. Heydenfeldt.—That will come up on the objection when it is heard. We are willing to concede that the grantee in that deed was a predecessor in interest of the defendant here now, but whether the defendant holds the title through that grantee or not, we do not know.

Mr. Wilson.—Holds whatever title——

Mr. Heydenfeldt.—We do not know that. There have been so many cross-deeds and so many conveyances and re-conveyances between these various parties connected with the defendant that we are not sure at all about the state of the title to that piece.

Mr. Wren.—We will make an offer of the deed, then, showing title.
Mr. Garber.—There will be no objection to that.
Mr. Wilson.—We have three or four conveyances.
Mr. Garber.—They are in your stipulation.
Mr. Wren.—We offer in evidence—I will have to look over the deeds now to give the names of the parties—well, the
970 deeds showing that the present Richmond Mining Company of Nevada has acquired all of the title that was conveyed under the deed just offered by the plaintiff.
Mr. Williams.—Give the date of the deed.
The Clerk.—The 26th of April, 1871.
Justice Field.—You make no objection to that?
Mr. Thornton.—No, sir. He can put in the deed.
Justice Field.—You do not admit the fact, as I understand it?
Mr. Wren.—No, sir.
Justice Field.—They only allow you to offer them.
Mr. Wren.—The deeds are only offered, that is all; subject to such objections as may be made, I suppose.

[This closed the testimony in the case, and the court adjourned until Monday next at half-past ten o'clock A. M.]

971 In the Circuit Court of the United States, Ninth Circuit, District of Nevada.

THE EUREKA CONSOLIDATED MINING COMPANY, Complainant,
vs.
THE RICHMOND MINING COMPANY OF NEVADA, Defendant.

THE RICHMOND MINING COMPANY OF NEVADA, Complainant,
vs.
THE EUREKA CONSOLIDATED MINING COMPANY, Defendant.

It is stipulated and agreed that the clerk may insert among the exhibits in the evidence the secauses, the Richmond, Tip-Top, Lookout, and Champion locations, and the map of complainant used on the trial.

GARBER & THORNTON,
Solicitors for the Eureka Consolidated Mining Company.

THOS. WREN,
Solicitor for the Richmond Mining Company of Nevada.

972 (Endorsed:) The Eureka Con. M. Co. vs. Richmond M. Co., &c., &c. Stipulation. Equity. Filed Sept. 17, 1877. T. J. Edwards, clerk.

973 CHAMPION.—EXHIBIT K.

We, the undersigned, locate and claim four hundred feet on this ledge or deposit, beginning at the northern boundary of the Buckeye mine on Ruby Hill, and running northerly on the mine known as the "Champion," with all dips, spurs, angles, and variations. We claim all privileges granted by the laws of Eureka Mining District. This shall be known as the Champion Ledge and Co.

MAY 23d, 1870. JOSEPH FARREN, 200.
H. H. ALLEN, 200.

Filed for record on the ground in Eureka District, May 23d, 1870.
D. S. McKAY, *Mining Recorder.*

RICHMOND.—EXHIBIT O.

We, the undersigned, have this, the 20th day of September, 1869, located and claim seven locations of one hundred feet square. We also claim seven locations of two hundred feet each on this,
975 the Richmond ledge, this ground more particularly described as located and situated adjoining the Champion claim on the south, and running north from Champion, and adjoining the claim known as the Tip-Top ledge, and located by Davis and Markinson.

We claim all dips, spurs, and angles, together all privileges granted by the mining laws of this district, Eureka Dist., Sept. 20th, 1869. This ledge to be known as the Richmond.

W. C. McCOY,	200 feet.
PATRICK DUGAN,	200 "
THOS. EVANS,	200 "
WM. ADAMS,	200 "
THOMAS SHORT,	200 "
DANIEL DALTON,	200 "
TIM. HEALY,	200 "

Filed for record, Sept. 20th, 1869.
A. MONROE, *Rec.*,
Per WM. ADAMS, *Dept.*

Situated on western slope of Ruby Hill.

TIP-TOP.—EXHIBIT P.

We, the undersigned, claim six hundred feet on this ledge, running on the course of the lead from this monument and notice, with all dips, spurs, and angles, and one hundred feet on
976 each side of the ledge for mining purposes.
Eureka Dist., Sept. 20th, 1869.

This ledge to be known as the Tip-Top.

THOMAS MACKENSON, 300 feet.
LLEWELLING DAVIS, 300 "

Filed for record on the ground, Sept. 20, '69.
A. MONROE, *Rec.*,
Per WM. ADAMS, *Dept.*

Situated on the western slope of Ruby Hill.

LOOKOUT CLAIM.—EXHIBIT Q.

We, the undersigned, have taken up and located a square location in accordance with the amended mining laws of this district, and do claim 400 feet northerly and southerly. By 200 feet easterly and westerly, being 100 feet each side of the hill monuments for the center, and is situated on the north end of Ruby Hill, Eureka District, Lander Co., Nev.

MAY THE 29th, 1869. ALEXANDER RAY, 200 feet square.
HARRY DALY, 100 feet square.
JOHN BENNETT, 100 feet square.
JAME8 PROUT, 100 feet square.
JAMES LASHEY, 100 feet square.
JAMES TYLER, 100 feet square.
977 DANIEL MEYERS, 100 feet square.

Filed for record on the ground, May 29th, 1869.
A. MONROE, *Recorder.*

[Here follows maps, marked pages 978 and 979,]

980 In the Circuit Court of the United States in and for the Ninth Circuit and District of Nevada.

THE EUREKA CONSOLIDATED MINING COMPANY,
Complainant,
vs.
THE RICHMOND MINING COMPANY OF NEVADA, ET ALS.,
Defendants.

THE RICHMOND MINING COMPANY OF NEVADA,
Complainant,
vs.
THE EUREKA CONSOLIDATED MINING COMPANY,
Defendant.

It is hereby stipulated that the above-entitled cases shall be heard and the decrees therein rendered upon the foregoing testimony and exhibits.

GARBER & THORNTON,
Solicitors for Complainant, The Eureka Con. Mining Co.

GARBER & THORNTON,
Solicitors for Defendant, The Eureka Consolidated Mg. Co.

THOS. WREN,
981 *Solicitor for Defendant, The Richmond Mining Company of Nevada.*

THOS. WREN,
Solicitor for Richmond Mining Company of Nevada, Complainant.

(Endorsed:) Eureka Con. M. Co. vs. Richmond M. Co. et als., &c., &c. Stipulation. Equity. Filed Sept. 17, 1877. T. J. Edwards, clerk.

In U. S. Circuit Court, Dist. of Nevada. Eureka Con. M. Co. v. Richmond M. Co. et als., and Richmond M. Co. et als. v. Eureka Con. M. Co. In equity. Testimony and exhibits. Filed Sept. 17, 1877. T. J. Edwards, clerk.

983 *The Construction of the Mining Statutes of the United States of* 1866 *and* 1872.

The opinion of the Circuit Court of the United States for the District of Nevada, in the case of The Eureka Consolidated Mining Company vs. The Richmond Mining Company of Nevada, delivered at San Francisco, August 22d, 1877, by Mr. Justice Field.

984 *Explanation.*

This case, by stipulation of the parties, was tried in San Francisco before the Hon. Stephen J. Field, Justice of the Supreme Court of the United States, the Hon. Lorenzo Sawyer, United States Circuit Judge of the 9th Circuit, and the Hon. E. W. Hillyer, United States District Judge for the District of Nevada.

The hearing began on the 23d of July, 1877. The witnesses occupied two weeks, and the argument of counsel three days. it was argued for the plaintiff by Messrs. Heydenfeldt, H. I. Thornton, and Mesick; and for the defendant by Messrs. S. M. Wilson and Thomas Wren. After the conclusion of the argument, the court held the case under advisement until the 22d of August, when Mr. Justice Field delivered the unanimous opinion of the court.

985 In the Circuit Court of the United States in and for the Ninth Circuit and District of Nevada.

THE EUREKA CONSOLIDATED MINING CO.
vs.
THE RICHMOND MINING CO. OF NEVADA.

This is an action for the possession of certain mining ground, particularly described in the complaint, situated in Eureka Mining District, in the county of Eureka, in the State of Nevada. The plaintiff is a corporation created under the laws of California, and the defendant, The Richmond Mining Company, is a corporation created under the laws of Nevada. The other defendants, Thomas Wren and Joseph Potts, are citizens of the latter state. The action was originally commenced in a state court of Nevada, but upon application of the plaintiff, and upon the ground of its incorporation in another state, and the presumed citizenship, from that fact, of its corporators or stockholders in that state, it was transferred to

the circuit court of the United States. The complaint in the state court, in addition to the usual allegations of a declaration in
986 ejectment, set forth various grounds, upon which was based a prayer for an order restraining the defendants from working the premises in controversy pending the action. The defendants, in their answer to the complaint, not only denied the title of the plaintiff, but made various averments, upon which a like restraining order against the plaintiff was asked. Both orders were granted. This union of a demand in ejectment for the property in controversy with a prayer for provisional equitable relief, is permitted by the system of procedure which obtains in the state, thus saving the parties the necessity of litigating in two suits what can as readily and less expensively be accomplished in one. But this union is not permitted in the federal courts; and upon the transfer of the present action, the pleadings of the plaintiff were amended, by substituting a regular complaint in ejectment on the law side of the court; and a bill was filed for an injunction on its equity side. The defendants answered both, and also filed a cross-bill for an injunction against the plaintiff.

By arrangement of the parties, the defendants, Messrs. Wren and Potts, are dropped out of the controversy, and their names may be stricken from the pleadings. The claim for damages is also waived in this action, without prejudice to any future proceedings with respect to them. By stipulation the case at law—the action of ejectment—is tried by the court without the intervention of a jury, and the judges sit at San Francisco, instead of Carson, their finding and judgment to be entered in term time in the latter place as though the case were heard and decided there. The testimony taken in the action at law is to be received as depositions in the equity suit, and both cases are to disposed of at the same
987 time, to the end that the whole controversy between the parties may be settled at once.

The premises in controversy are of great value, amounting by estimation to several hundred thousands of dollars, and the case has been prepare for trial with a care proportionate to this estimate of the value of the property; and the trial has been conducted by counsel on both sides with eminent ability.

Whatever could inform, instruct, or enlighten the court has been presented by them. Practical miners have given us their testimony as to the location and working of the mine. Men of science have explained to us how it was probable that nature in her processes had deposited the mineral where it is found. Models of glass have made the hill, where the mining ground lies, transparent, so that we have been able to trace the course of the veins, and see the chambers of ore found in its depths. For myself, after a somewhat extended judicial experience, covering now a period of nearly twenty years, I can say that I have seldom, if ever, seen a case involving the consideration of so many and varied particulars, more

thoroughly prepared or more ably presented. And what has added a charm to the whole trial has been the conduct of counsel on both sides, who have appeared to assist each other in the development of the facts of the case, and have furnished an illustration of the truth that the highest courtesy is consistent with the most earnest contention.

The mining ground which forms the subject of controversy is situated in a hill known as Ruby Hill, a spur of Prospect mountain, distant about two miles from the town of Eureka, in Nevada. Prospect mountain is several miles in length, running in a north-
988 erly and southerly course. Adjoining its northerly end is this spur called Ruby Hill, which extends thence westerly, or in a southwesterly direction. [Along and through this hill for a distance slightly exceeding a mile, is a zone of limestone, in which, at different places throughout its length, and in various forms, mineral is found, this mineral appearing sometimes in a series or succession of ore-bodies more or less closely connected, sometimes in apparently isolated chambers, and at other times in what would seem to be scattered grains.] And our principal inquiry is to ascertain the character of this zone, in order to determine whether it is to be treated as constituting one lode, or as embracing several lodes, as that term is used in the acts of Congress of 1866 and 1872, under which the parties have acquired whatever rights they possess. In this inquiry the first thing to be settled is the meaning of the term in those acts. This meaning being settled, the physical characteristics and the distinguishing features of the zone will be considered.

Those acts give no definition of the term. They use it always in connection with the term vein. The act of 1866 provided for the acquisition of a patent by any person or association of persons claiming "a vein or lode of quartz, or other rock in place, bearing gold, silver, cinnabar, or copper." The act of 1872 speaks of veins or lodes of quartz or other rock in place, bearing similar metals or ores. Any definition of the term should, therefore, be sufficiently broad to embrace deposits of the several metals or ores here mentioned. In the construction of statutes general terms must receive that interpretation which will include all the instances enumerated as comprehended by them. The definition of a lode given by geologists is, that of a fissure in the earth's crust filled with
989 mineral matter, or more accurately, as aggregations of mineral matter containing ores in fissures. (See Von Cotta's Treatise on Ore Deposits, Prime's Translation, 26.) But miners used the term before geologists attempted to give it a definition. One of the witnesses in this case, Dr. Raymond, who for many years was in the service of the general government as commissioner of mining statistics, and in that capacity had occasion to examine and report upon a large number of mines in the States of Nevada and California, and the Territories of Utah and Colorado, says that he has

been accustomed as a mining engineer to attach very little importance to those cases of classification of deposits which simply involve the referring of the subject back to verbal definitions in the books. The whole subject of the classification of mineral deposits, he states, to be one in which the interests of the miner have entirely overriden the reasonings of the chemists and geologists. "The miners," to use his language, "made the definition first. As used by miners, before being defined by any authority, the term lode simply meant that formation by which the miner could be led or guided. It is an alteration of the verb lead; and whatever the miner could follow, expecting to find ore, was his lode. Some formation within which he could find ore, and out of which he could not expect to find ore, was his lode." The term lodestar, guiding star, or north star, he adds, is of the same origin. Cinnabar is not found in any fissure of the earth's crust, or in any lode as defined by geologists, yet the acts of Congress speak, as already seen, of lodes of quartz, or rock in place bearing cinnabar. Any definition of lode as there used, which did not embrace deposits of cinnabar, would be as defective as if it did not embrace deposits of gold or silver.

990 The definition must apply to deposits of all the metals named, if it apply to a deposit of any one of them. Those acts were not drawn by geologists or for geologists; they were not framed in the interests of science, and consequently with scientific accuracy in the use of terms. They were framed for the protection of miners in the claims which they had located and developed, and should receive such a construction as will carry out this purpose. The use of the term *vein* and *lode* in connection with each other in the act of 1866, and their use in connection with the term *ledge* in the act of 1872, would seem to indicate that it was the object of the legislator to avoid any limitation in the application of the acts, which a scientific definition of any one of these terms might impose.

It is difficult to give any definition of the term as understood and used in the acts of Congress, which will not be subject to criticism. A fissure in the earth's crust—an opening in its rocks and strata made by some force of nature, in which the mineral is deposited, would seem to be essential to the definition of a lode in the judgment of geologists. But to the practical miner, the fissure and its walls are only of importance as indicating the boundaries within which he may look for and reasonably expect to find the ore he seeks. A continous body of mineralized rock lying within any other well-defined boundaries on the earth's surface and under it, would equally constitute, in his eyes, a lode. We are of opinion, therefore, that the term as used in the acts of Congress is applicable to any zone or belt of mineralized rock lying with boundaries clearly separating it from the neighboring rock. It includes, to use the language cited by counsel, all deposits of mineral matter found through a mineralized zone or belt coming from the same

991 source, impressed with the same forms, and appearing to have been created by the same processes.

Examining, now, with this definition in mind, the features of the zone which separate and distinguish it from the surrounding country, we experience little difficulty in determining its character. We find that it is contained within clearly-defined limits, and that it bears unmistakable marks of originating, in all its parts, under the influence of the same creative forces. It is bounded on the south side, for its whole length, at least so far as explorations have been made, by a wall of quartzite of several hundred feet in thickness; and on its north side, for a like extent, by a belt of clay, or shale, ranging in thickness from less than an inch to seventy or eighty feet. At the east end of the zone, in the Jackson mine, the quartzite and shale approach so closely as to be separated by a bare seam, less than an inch in width. From that point they diverge, until on the surface in the Eureka mine, they are about 500 feet apart, and on the surface in the Richmond mine, about 800 feet. The quartzite has a general dip to the north, at an angle of about 45 degrees, subject to some local variations, as the course changes. The clay or shale is more perpendicular, having a dip at an angle of about 80 degrees. At some depth under the surface, these two boundaries of the limestone, descending at their respective angles, may come together. In some of the levels worked, they are now only from two to three hundred feet apart.

The limestone found between these two limits—the wall of quartzite and the seam of clay or shale—has, at some period of the world's history, been subjected to some dynamic force of nature, by which it has been broken up, crushed, disintegrated, and
992 fissured in all directions, so as to destroy, except in three or four places of a few feet each, so far as explorations show, all traces of stratification; thus specially fitting it, according to the testimony of the men of science, to whom we have listened, for the reception of the mineral which, in ages past, came up from the depths below in solution, and was deposited in it. Evidence that the whole mass of limestone has been, at some period, lifted up and moved along the quartzite, is found in the marks of attrition engraved on the rock. This broken, crushed, and fissured condition pervades, to a greater or less extent, the whole body, showing that the same forces which operated upon a part, operated upon the whole, and at the same time. Wherever the quartzite is exposed, the marks of attrition appear. Below the quartzite no ore has penetrated. Above the shale the rock has not been thus broken and crushed. Stratification exists there. If in some isolated places there is found evidence of disturbance, that disturbance has not been sufficient to affect the stratification. The broken, crushed, and fissured condition of the limestone gives it a specific, individual character, by which it can be identified and separated from all other limestone in the vicinity.

In this zone of limestone numerous caves or chambers are found, further distinguishing it from the neighboring rock. The limestone

being broken and crushed up as stated, the water from above readily penetrated into it, and, operating as a solvent, formed these caves and chambers. No similar cavities are found in the rock beyond the shale, its hard and unbroken character not permitting, or, at least, opposing such action from the water above.

993 Oxide of iron is also found in numerous places, throughout the zone, giving to the miner assurance that the metal he seeks is in its vicinity.

This broken, crushed, and fissured condition of the limestone, the presence of the oxides of iron, the caves or chambers we have mentioned, with the wall of quartzite and seam of clay bounding it, give to the zone, in the eyes of the practical miner an individuality, a oneness as complete as that which the most perfect lode in a geological sense ever possessed. Each of the characteristics named, though produced at a different period from the others, was undoubtedly caused by the same forces operating at the same time upon the whole body of the limestone.

Throughout this zone of limestone, as we have already stated, mineral is found in the numerous fissures of the rock. According to the opinions of all the scientific men who have been examined, this mineral was brought up in solution from the depths of the earth below, and would, therefore, naturally be very irregularly deposited in the fissures of the crushed matter, as these fissures are in every variety of form and size, and would also find its way in minute particles in the loose material of the rock. The evidence shows that it is sufficiently diffused to justify giving to the limestone the general designation of mineralized matter—metal-bearing rock. The three scientific experts produced by the plaintiff, Mr. Keyes, Mr. Raymond, and Mr. Hunt, all of them of large experience and extensive attainments, and two of them of national reputation, have given it as their opinion, after examining the ground, that the zone of limestone between the quartzite and the shale constitutes one vein or lode, in the sense in which those terms are used by miners.

994 Mr. Keyes, who for years was superintendent of the mine of the plaintiff, concludes a minute description of the character and developments of the ground, by stating that, in his judgment, according to the customs of miners in this country and common sense, the whole of that space should be considered and accepted as a lead, lode, or ledge of metal-bearing rock in place.

Dr. Raymond, after giving a like extended account of the character of the ground, and his opinion as to the causes of its formation, and stating with great minuteness the observations he had made, concludes by announcing as his judgment, after carefully weighing all that he had seen, that the deposit between the quartzite and the shale is to be considered as a single vein in the sense in which the word is used by miners—that is, as a single ore-deposit of identical origin, age, and character throughout.

Dr. Hunt, after stating the result of his examination of the ground

and his theory as to the formation of the mine, gives his judgment, as follows:

"My conclusion is this: That this whole mass of rock is impregnated with ore; that although the great mass of ore stretches for a long distance above horizontally and along an incline down the foot wall, as I have traced it, from this deposit you can also trace the ore into a succession of great cavities or bonanzas lying irregularly across the limestone, and into smaller caverns or chasms of the same sort; and that the whole mass of the limestone is irregularly impregnated with the ore. I use the word impregnation in the sense that it has penetrated here and there; little patches and stains, ore-vugs and caverns and spaces of all sizes and all shapes, irregularly disseminated through the mass. * * * I conclude, therefore, that this great mass of ore is, in the proper sense
995 of the word, a great lode, or a great vein, in the sense in which the word is used by miners; and that practically the only way of utilizing this deposit, is to treat the whole of it as one great ore-bearing lode or mass of rock."

This conclusion as to the zone constituting one lode of rock-bearing metal, it is true, is not adopted by the men of science produced as witnesses by the defendant, the Richmond Company. These latter gentlemen, like the others, have had a large experience in the examination of mines, and some of them have acquired a national reputation for their scientific attainments. No one questions their learning or ability, or the sincerity with which they have expressed their convictions. They agree with the plaintiff's witnesses as to the existence of the mineralized zone of limestone with an underlying quartzite and an overlying shale; as to the broken and crushed condition of the limestone, and substantially as to the origin of the metal and its deposition in the rock. In nearly all other respects they disagree. In their judgment the zone of limestone has no features of a lode. It has no continuous fissure, says Mr. King, to mark it as a lode. A lode, he adds, must have a foot wall and a hanging wall, and if it is broad, these must connect at both ends, and must connect downwards. Here there is no hanging wall or foot wall; the limestone only rests as a matter of stratigraphical fact on underlying quartzite, and the shale overlies it. And distinguishing the structure at Ruby Hill from the Comstock lode, the same witness says that the one is a series of sedimentary beds laid down in the ocean and turned up; the other is a fissure extending between two rocks.

995 The other witnesses of the defendant, so far as they have expressed any opinion as to what constitutes a lode, have agreed with the views of Mr. King. It is impossible not to perceive that these gentlemen at all times carried in their minds the scientific definition of the term as given by geologists—that a lode is a fissure in the earth's crust filled with mineral matter—and disregarded the broader, though less scientific definition of the miner

who applies the term to all zones or belts of metal-bearing rock lying within clearly marked boundaries. For the reasons already stated, we are of opinion that the acts of Congress use the term in the sense in which miners understand it.

If the scientific definition of a lode, as given by geologists, could be accepted as the only proper one in this case, the theory of distinct veins existing in distinct fissures of the limestone, would be not only plausible, but reasonable; for that definition is not met by the conditions in which the Eureka mineralized zone appears. But as that definition cannot be accepted, and the zone presents the case of a lode as that term is understood by miners, the theory of separate veins, as distinct and disconnected bodies of ore falls to the ground. It is, therefore, of little consequence what name is given to the bodies of ore in the limestone, whether they be called pipe-veins, rake-veins, or pipes of ore, or receive the new designation suggested by one of the witnesses, they are but parts of one greater deposit, which permeates, in a greater or less degree, with occasional intervening spaces of barren rock, the whole mass of limestone, from the Jackson mine to the Richmond, inclusive.

The acts of Congress of 1866 and 1872 dealt with a practical necessity of miners; they were passed to protect locations on veins or lodes, as miners understood those terms. Instances without
996 number exist where the meaning of words in a statute has been enlarged or restricted and qualified to carry out the intention of the legislature. The inquiry, where any uncertainty exists, is always as to what the legislature intended, and when that is ascertained it controls. In a recent case before the Supreme Court of the United States, singing-birds were held not to be live animals, within the meaning of a revenue act of Congress. (*Reiche* v. *Smythe*, 13 Wall., 162.) And in a previous case, arising upon the construction of the Oregon donation act of Congress, the term, a single man, was held to include in its meaning an unmarried woman. (*Silver* v. *Ladd*, 7 Wall., 219.) If any one will examine the two decisions, reported as they are in Wallace's Reports, he will find good reasons for both of them.

Our judgment being that the limestone zone in Ruby Hill, in Eureka district, lying between the quartzite and the shale, constitutes, within the meaning of the acts of Congress, one lode of rock bearing metal, we proceed to consider the rights conveyed to the parties by their respective patents from the United States. All these patents are founded upon previous locations, taken up and improved according to the customs and rules of miners in the district. Each patent is evidence of a perfected right in the patentee to the claim conveyed, the initiatory step for the acquisition of which was the original location. If the date of such location be stated in the instrument, or appear from the record of its entry in the local land office, the patent will take effect by relation as of that date, so far as may be necessary to cut off all intervening claimants, unless the

prior right of the patentee, by virtue of his earlier location, has been lost by a failure to contest the claim of the intervening
997 claimant, as provided in the act of 1872. As in the system established for the alienation of the public lands, the patent is the consummation of a series of acts, having for their object the acquisition of the title, the general rule is to give to it an operation by relation at the date of the initiatory step, so far as may be necessary to protect the patentee against subsequent claimants to the same property. As was said by the supreme court in the case of *Shepley* v. *Cowan*, (1st Otto, 338,) where two parties are contending for the same property, the first in time, in the commencement of proceedings for the acquisition of the title, when the same are regularly followed up, is deemed to be the first in right.

But this principle has been qualified in its application to patents of mining ground, by provisions in the act of 1872, for the settlement of adverse claims before the issue of the patent. Under that act, when one is seeking a patent for his mining location and gives proper notice of the fact as there prescribed, any other claimant of an unpatented location objecting to the patent of the claim, either on account of its extent or form, or because of asserted prior location, must come forward with his objections and present them, or he will afterwards be precluded from objecting to the issue of the patent. While, therefore, the general doctrine of relation applies to mining patents so as to cut off intervening claimants, if any there can be, deriving title from other sources, such perhaps as might arise from a subsequent location of school warrants or a subsequent purchase from the state, as in the case of *Heydenfeldt* v. *Daney Gold Mining Company*, reported in the third of Otto, the doctrine cannot be applied so as to cut off the rights of the earlier patentee, under a later location where no opposition to that location was made un-
998 der the statute. The silence of the first locator is, under the statute, a waiver of his priority.

But from the view we take of the rights of the parties under their respective patents, and the locations upon which those patents were issued, the question of priority of location is of no practical consequence in the case.

The plaintiff is the patentee of several locations on the Ruby Hill lode, but for the purpose of this action it is only necessary to refer to three of them—the patents for the Champion, the At Last, and the Lupita or Margaret claims. The first of these patents was issued in 1872, the second in 1876, and the third in 1877. Within the end lines of the locations, as patented in all these cases, when drawn down vertically through the lode, the property in controversy falls. Objection is taken to the validity of the last two patents, because the end lines of the surface locations patented are not parallel, as required by the act of 1872. But to this objection there are several obvious answers. In the first place it does not appear upon what locations the patents were issued. They may have been,

and probably were, issued upon locations made under the act of 1866, where such parallelism in the end lines of the surface locations was not required. The presumption of the law is, that the officers of the Executive Department specially charged with the supervision of applications for mining patents, and the issue of such patents, did their duty; and in an action of ejectment, mere surmises to the contrary will not be listened to. If, under any possible circumstances, a patent for a location without such parallelism may be valid, the law will presume that such circumstances existed.

A patent of the United States for land, whether agricultural
1000 or mineral, is something upon which its holder can rely for peace and security in his possessions. In its potency it is ironclad against all mere speculative inferences. In the second place, the provision of the statute of 1872, requiring the lines of each claim to be parallel to each other, is merely directory, and no consequence is attached to a deviation from its direction. Its object is to secure parallel end lines drawn vertically down, and that was effected in these cases by taking the extreme points of the respective locations on the length of the lode. In the third place, the defect alleged does not concern the defendant, and no one but the government has the right to complain.

The defendant, The Richmond Mining Company, also holds several patents issued to it upon different locations; but in this case it specially relies upon the patents of the Richmond and Tip-Top claims. It is alleged that these patents were issued upon locations made earlier than any upon which the patents to the plaintiff were issued. Assuming this to be the fact, and claiming from it that the patents ante-date in their operation, by relation back to such locations, the patents of the plaintiff; and the further fact that the locations were made under the act of 1866, the defendant relies to defeat the pretensions of the plaintiff. It contends that inasmuch as the croppings of the vein it works are within the surface of its patented locations, it can follow the vein wherever it leads, though it be outside of the end lines of the locations when vertically drawn down through the lode. Its position is that whenever under the law of 1866, a location was made on a lode or vein, a right was acquired to follow the vein wherever it might lead, without
1001 regard to the end lines of the location. This position is urged with great persistence by one of the counsel of the defendant, and with the ability which characterizes all his discussions.

The second section of the act of 1866, upon the provisions of which this position is based, provides, "that whenever any person, or association of persons, claims a vein or lode of quartz, or other rock in place, bearing gold, silver, cinnabar, or copper, having previously occupied and improved the same according to local customs or rules of miners in the district where the same is situated, and having expended, in actual labor and improvements thereon, an

amount of not less than one thousand dollars, and in regard to whose possession there is no controversy, or opposing claim, it shall and may be lawful for said claimant, or association of claimants, to file in the local land office a diagram of the same, so extended, laterally or otherwise, as to conform to the local laws, customs, and rules of miners, and to enter such tract and receive a patent therefor, granting such mine, together with the right to follow such vein or lode, with its dips, angles, and variations, to any depth, although it may enter the land adjoining, which land adjoining shall be sold subject to this condition."

It will be seen by this section that to entitle a party to a patent, his claim must have been occupied and improved according to the local customs or rules of miners of the district, and that his diagram of the same filed in the land office in its extension laterally or otherwise, must be in conformity with them.

The rules of the miners in the Eureka Mining District, adopted in 1865—laws of the district, as they are termed by the miners—provided that claims of mining ground should be made by
1002 posting a written notice on the claimant's ledge, defining its boundaries if possible; that each claim should consist of two hundred feet on the ledge, but claimants might consolidate their claims by locating in a common name, if in the aggregate no more ground was claimed than two hundred feet for each name, and that each locator should be entitled to all dips, spurs, and angles connecting with his ledge; and that a record of all claims should be made within ten days from the date of location. The rules also allowed claimants to hold one hundred feet each side of their ledge for mining and building purposes, but declared that they should not be entitled to any other ledge within this surface.

It will be perceived by these rules that they had reference entirely to locations of claims on ledges. It would seem that the miners of the district then supposed that the mineral in the district was only found in veins or ledges, and not in isolated deposits. In February, 1869, new rules were added to those previously passed, authorizing the location of such deposits. These new rules provided that each deposit claim should consist of one hundred feet square, and that the location should take all the mineral within the ground to any depth.

Under these rules square locations and linear locations were made by parties through whom the defendant derives title on what is called the Richmond ledge, and linear locations were made on what is called the Tip-Top ledge with surface locations for mining purposes, both parties claiming with their locations all dips, spurs, and angles. It is only of the linear locations we have occasion to speak; it is under them that the defendant asserts title to the premises in controversy.

1003 Now, as neither the rules of miners in Eureka Mining District, nor the act of 1866, *in terms*, speak of end lines to lo-

cations made on ledges, nor in terms impose any limitation upon miners, following these veins wherever they may lead, it is contended that no such limitation can be considered as having existed and be enforced against the defendant. The act of 1866, it is said, recognizes the right of the locator to follow his vein outside of any end lines drawn vertically down when it permits him to obtain a patent granting his mine, "together with the right to follow such vein or lode, with its dips, angles, and variations, to any depth, although it may enter the land adjoining, which land adjoining shall be sold subject to this condition."

It is true that end lines are not in terms named in the rules of the miners, but they are necessarily implied, and no reasonable construction can be given to them without such implication. What the miners meant by allowing a certain number of feet on a ledge was that each locator might follow his vein for that distance on the course of the ledge, and to any depth within that distance. So much of the ledge he was permitted to hold as lay within vertical planes drawn down through the end lines of his location, and could be measured anywhere by the feet on the surface. If this were not so, he might by the bend of his vein hold under the surface along the course of the ledge double and treble the amount he could take on the surface. Indeed, instead of being limited by the number of feet prescribed by the rules, he might in some cases oust all his neighbors, and take the whole ledge. No construction is permissible which would substantially defeat the limitation of quantity on a ledge, which was the most important provision in the whole system of rules.

1004 Similar rules have been adopted in numerous mining districts, and the construction thus given has been uniformly and everywhere followed. We are confident that no other construction has ever been adopted in any mining district in California or Nevada. And the construction is one which the law would require in the absence of any construction by miners. If, for instance, the state were to-day to deed a block in the city of San Francisco to twenty persons, each to take twenty feet front, in a certain specified succession, each would have assigned to him by the law a section parallel with that of his neighbor, of twenty feet in width cut through the block. No other mode of division would carry out the grant.

The act of 1866 in no respect enlarges the right of the claimant beyond that which the rules of the mining district gave him. The patent which the act allows him to obtain does not authorize him to go outside of the end lines of his claim, drawn down vertically through the ledge or lode. It only authorizes him to follow his vein with its dips, angles, and variations, to any depth, although it may enter land adjoining, that is, land lying beyond the area included within his surface lines. It is land lying on the side of the claim, not on the ends of it, which may be entered. The land on the ends is reserved for other claimants to explore. It is true, as

stated by the defendant, that the surface land taken up in connection with a linear location on the ledge or lode is, under the act of 1866, intended solely for the convenient working of the mine, and does not measure the miner's right, either to the linear feet upon its course, or to follow the dips, angles, and variations of the vein, or control the direction he shall take. But the line of loca-
1005 tion taken does measure the extent of the miner's right. That must be along the general course or strike, as it is termed, of the ledge or lode. Lines drawn vertically down through the ledge or lode at right angles with a line representing this general course, at the ends of the claimant's line of location, will carve out, so to speak, a section of the ledge or lode, within which he is permitted to work, and out of which he cannot pass.

As the act of 1866 requires the applicant for a patent to file in the local office a diagram of his claim, such diagram must necessarily present something more than the mere linear location. It is intended that it should embrace the surface claimed, for the working of the mine. In this way each of the patents of the parties embraces one or more acres and the fraction of an acre of surface ground and some hundred linear feet on the lode.

The act of 1872, preserves to the miner the rights acquired under the act of 1866, and confers upon him additional rights. Under the act of 1866, he could only hold one lode, or vein, although more than one appeared within the lines of his surface location. The surface ground was allowed him for the convenient working of the lode or vein located and for no other purpose; it conferred no right to any other lode or vein. But the act of 1872, alters the law in this respect; it grants to him the exclusive right of possession to a quantity of surface ground not exceeding a specified amount, and not only to the particular lode or vein located, but to all other veins, lodes, and ledges, the top or apex of which lies within the surface lines of his location, with the right to follow such veins, lodes,
1006 or ledges, to any depth. But these additional rights are granted subject to the limitation that in following the veins, lodes, or ledges, the miner shall be confined to such portions thereof, as lie between vertical planes drawn downward through the end lines of his location, and a further limitation upon his right in cases where two or more veins intersect or cross each other. The act in terms annexes these conditions to the possession, not only of claims, subsequently located, but to the possession of those previously located. This fact taken in connection with the reservation of all rights acquired under the act of 1866, indicates that in the opinion of the legislature no change was made in the rights of previous locators by confining their claims within the end lines. The act simply recognized a pre-existing rule, applied by miners to a single vein or lode of the locator, and made it applicable to all veins or lodes found within the surface lines.

Our opinion, therefore, is that both the defendant and the plain-

tiff, by virtue of their respective patents, whether issued upon locations under the act of 1866, or under the act of 1872, were limited to veins or lodes lying within planes drawn vertically downward through the end lines of their respective locations; and that each took the ores found within those planes at any depth in all veins or lodes, the apex or top of which lay within the surface lines of its locations.

The question of priority of location is therefore, as already stated, of no practical importance in the case. This question can only be important where the lines of one patent overlap those of another patent. Here neither plaintiff nor defendant could pass outside of the end lines of its own locations, whether they were made
1007 before or after those upon which the other party relies. And inasmuch as the ground in dispute lies within planes drawn vertically downward through the end lines of the plaintiff's patented locations, our conclusion is that the ground is the property of the plaintiff, and that judgment must be for its possession in its favor.

The same conclusion would be reached if we looked only to the agreement of the parties made on the 16th of June, 1873. At that time the plaintiff owned the patented claim called the Lookout claim, adjoining on the north, the Richmond claim. The defendant had worked down from an incline in the Richmond and Tip-Top into the ore under the surface-lines of the Lookout patent. The plaintiff thereupon brought an action for the recovery of the ground and the ores taken from it. A compromise and settlement followed, which are contained in an agreement of that date, and were carried out by an exchange of deeds. A map or plat was made showing the different claims held by the two parties. A line was drawn upon this map, on one side of which lay the Champion, the At-Last, and the Margaret claims, and on the other side lay the Richmond and the Lookout claims. By the agreement of the parties, the plaintiff, on the one hand, was to convey to the defendant the Lookout ground, and also all the mining ground lying on the northwesterly side of the line designated, with the ores, precious metals, veins, lodes, ledges, deposits, dips, spurs, or angles, on, in, or under the same, and to dismiss all pending actions against the defendant; and on the other hand, the defendant was to pay to the plaintiff the sum of $85,000, and to convey with warranty against its own acts, all its right, title, or interest in and to all the mining ground situated in the Eureka Mining District, on the south-
1008 easterly side of the designated line, and in and to all ores, precious metals, veins, lodes, ledges, deposits, dips, spurs, or angles, on, in, or under the same—"it being," says the agreement, "the object and intention of the said parties hereto to confine the workings of the party of the second part (the Richmond Mining Company) to the northwesterly side of the said line continued downward to the centre of the earth, which line is hereby agreed upon as the permanent boundary line between the claims of the said parties."

The deeds executed between the parties the same day were in accordance with this agreement. The deed of the Richmond Mining Company to the plaintiff conveyed all the mining ground lying on the southeasterly side of the designated line, "together with all the dips, spurs, and angles, and also all the metals, ores, gold and silver-bearing quartz, rock and earth therein, and all the rights, privileges, and franchises thereto incident, appendant, and appurtenant, or therewith usually had and enjoyed."

The line thus designated extended down in a direct line along the dip of the lode would cut the Potts chamber, and give the ground in dispute to the plaintiff. That it must be so extended necessarily follows from the character of some of the claims it divides. As the Richmond and the Champion were vein or lode claims, a line dividing them must be extended along the dip of the vein or lode, so far as that goes, or it will not constitute a boundary between them. All lines dividing claims upon veins or lodes necessarily divide all that the location on the surface carries, and would not serve as a boundary between them if such were not the case. The plaintiff would, therefore, be the owner of the ground in dispute by
1009 the deed of the defendant, even if it could not assert such ownership solely upon its patented locations. Our finding, therefore, is for the plaintiff, and judgment must be entered thereon in its favor for the possession of the premises in controversy.

FIELD, *Presiding Justice.*
SAWYER, *Circuit Judge.*
HILLYER, *District Judge.*

(Endorsed:) Filed Sept. 17, 1877. T. J. Edwards, clerk.

1010 In the Circuit Court of the United States in and for the Ninth Circuit and District of Nevada.

THE EUREKA CONSOLIDATED MINING COMPANY, Complainant, *vs.* THE RICHMOND MINING COMPANY ET AL., Defendants.	In Equity. March Term, A.D. 1877.

This cause came on to be heard at this term, and was argued by counsel; and, thereupon, upon consideration thereof, it was ordered, adjudged, and decreed as follows, viz: That the said defendant, The Richmond Mining Company of Nevada, and its servants, agents, and employees be, and hereby are, severally and perpetually restrained and enjoined from entering into or upon, or working or mining in or upon, or taking or removing any silver or other ore, earth or rock or other substance from, or otherwise interfering with the mine, mining ground, lode, property, and premises in the said complainant's bill of complaint herein described, or any portion thereof, or from entering upon or in or working

upon or in or mining in or upon or otherwise interfering with the mining ground described in said complaint as lying between
1011 the quartzite and shale and included between planes drawn vertically downward through the west end line of the Champion patent annexed to said complaint, and the east end line of the Mammoth patent annexed to said complaint; said planes being indefinitely extended, except that portion thereof included, enclosed, and confined within the following surface lines drawn downward vertically, to wit: Beginning at a point whence the southwest corner of the Buckeye or southeast corner of the Champion bears south 52° east $202\frac{2}{10}$ feet; running thence north 52° west $147\frac{8}{10}$ feet; thence north 38° east 153 feet, and thence south 6° east $212\frac{8}{10}$ feet to the point of beginning; and except that portion thereof lying and being south of the said line drawn down vertically beginning at a point whence the southwest corner of the Buckeye or southeast corner of the Champion bears south 52° east $202\frac{2}{10}$ feet, and running thence north 52° west $147\frac{8}{10}$ feet.

And it is further decreed that the complainant recover of the defendant, The Richmond Mining Company of Nevada, the sum of four hundred and ten and $\frac{52}{100}$ dollars, its legal taxable costs in this cause.

1012 And it is further ordered that the clerk of this court do issue proper writs of injunction and execution for the carrying this decree into effect, on application of complainant.

Sept. 17, 1877.

(Endorsed:) U. S. Circuit Court, Dist. of Nevada. Eureka Con. Mining Company vs. Richmond Mg. Company of Nevada. In equity. Decree. Filed Sept. 17, 1877. T. J. Edwards, clerk.

1013 In the Circuit Court of the United States in and for the Ninth Circuit and District of Nevada.

THE RICHMOND MINING COMPANY OF NEVADA, Complainant, *vs.* THE EUREKA CONSOLIDATED MINING COMPANY, Defendant.	In Equity. March Term, A. D. 1877.

This cause came on to be heard at this term, and was argued by counsel, and thereupon, upon consideration thereof, it was ordered, adjudged, and decreed as follows, viz: That the bill of the said complainant herein do stand dismissed out of this court on the merits thereof, with costs taxed at twenty and $\frac{00}{100}$ dollars.

And it is further decreed that all injunctions and restraining orders hereinbefore made or issued, commanding the said defendant to refrain from any act or from working upon the mining ground in the cross-complaint or bill of complaint herein described, or with reference to said ground, be, and the same hereby are, vacated and discharged.

And it is further decreed that the defendant recover of the
1014 complainant the said sum of twenty and $\frac{50}{100}$ dollars, its legal, taxable costs in this cause, and that the clerk of this court do issue a proper writ of execution therefor.

Sept. 17, 1877.

(Endorsed:) U. S. Circuit Court, District of Nevada. Richmond Mining Company of Nevada vs. Eureka Con. Mining Company. Decree. Filed Sept. 17, 1877. T. J. Edwards, clerk.

1015 At the March term, 1877, of the Circuit Court of the United States for the District of Nevada, held at Carson City, on the 17th day of September, 1877; present Honorable Stephen J. Field, presiding justice, and Honorable E. W. Hillyer, associate justice; the following proceedings were had and entered of record, viz:

* * * * * * * * *

EUREKA CON. M. Co.
vs.
RICHMOND M. Co. OF NEVADA, ET ALS. } In Equity.

* * * * * * * * *

On motion of Thomas Wren, esq., sol'r for defendants, it is ordered that an appeal herein to the Supreme Court be and is hereby allowed and granted the defendants.

RICHMOND MIN'G CO. OF NEVADA
vs.
EUREKA CON. M. CO. } In Equity.

* * * * * * * * *

Thereupon, and on motion of Thos. Wren, esq., solicitor for complainant, it is further ordered that an appeal herein to
1016 the Supreme Court be and is hereby allowed and granted to the complainant.

1017 In the Supreme Court of the United States.

THE EUREKA CONSOLIDATED MINING COMPANY, PLAINTIFF,
vs.
THE RICHMOND MINING COMPANY OF NEVADA, DEFENDANT.

Know all men by these presents, that we, Jonas Meyer and Mathias Meyer, are held and firmly bound unto the Eureka Consolidated Mining Company in the sum of one thousand dollars, to be paid to the said The Eureka Consolidated Mining Company, or its successors.

To which payment well and truly to be made, we bind ourselves and each of us jointly and severally, and our and each of our heirs, executors, and administrators firmly by these presents.

Sealed with our seals, dated this 29th day of September, A. D. 1877.

Whereas, the above-named defendant, The Richmond Mining Company of Nevada, has prosecuted an appeal to the Supreme Court of the United States of America to reverse the decree entered in the above-entitled action by the Circuit Court of the United States for the Ninth Circuit and District of Nevada.

1018 Now, therefore, the condition of this obligation is such that if the above-named, The Richmond Mining Company of Nevada, in said above-entitled action shall prosecute its said appeal to effect and answer all damages and costs if it shall fail to make good its plea, then this obligation shall be void, otherwise to remain in full force and virtue.

JONAS MEYER. [SEAL.]
MATHIAS MEYER. [SEAL.]

Signed, sealed, and delivered in presence of—
JOS. F. O'BEIRNE.

UNITED STATES OF AMERICA, } ss.
DISTRICT OF NEVADA. }

Jonas Meyer and Mathias Meyer being duly sworn, each for himself deposes and says that he is a householder and freeholder and is worth the sum of one thousand dollars exclusive of property exempt from execution and over and above all his just debts and liabilities.

JONAS MEYER.
MATHIAS MEYER.

Subscribed and sworn to before me, this 29th day of September, A. D. 1877.

1019 JOS. F. O'BEIRNE,
Commr. U. S. Circuit Court, District of California.

(Endorsed:) United States Supreme Court. The Eureka Consolidated Mining Company vs. The Richmond Mining Company of Nevada. Bond on appeal. Approved at chambers, this Sept. 29th, 1877. Filed Oct. 1, 1877. T. J. Edwards, Clerk U. S. Cir. Court, Dist. Nevada.

1020 In the Supreme Court of the United States.

THE RICHMOND MINING COMPANY OF NEVADA,
Plaintiff,
vs.
THE EUREKA CONSOLIDATED MINING COMPANY,
Defendant.

Know all men by these presents, that we, Jonas Meyer and Mathias Meyer, are held and firmly bound unto The Eureka Consolidated Mining Company in the sum of one thousand dollars, to be

paid to the said The Eureka Consolidated Mining Company or its successors.

To which payment, well and truly to be made, we bind ourselves and each of us, jointly and severally, and our and each of our heirs, executors, and administrators firmly by these presents.

Sealed with our seals, dated this 29th day of September, A. D. 1877.

Whereas, the above-named plaintiff, The Richmand Mining Company of Nevada, has prosecuted an appeal to the Supreme Court of the United States of America to reverse the decree entered in the above-entitled action by the Circuit Court of the United States for the Ninth Circuit and District of Nevada.

1021 Now, therefore, the condition of this obligation is such, that if the above-named, The Richmond Mining Company of Nevada in said above-entitled action, shall prosecute its said appeal to effect and answer all damages and costs if it shall fail to make good its plea, then this obligation shall be void, otherwise to remain in full force and virtue.

JONAS MEYER. [SEAL.]
MATHIAS MEYER. [SEAL.]

Signed, sealed, and delivered in the presence of—
JOS. F. O'BEIRNE.

UNITED STATES OF AMERICA,
DISTRICT OF NEVADA.

Jonas Meyer and Mathias Meyer being duly sworn, each for himself deposes and says, that he is a householder and freeholder, and is worth the sum of one thousand dollars exclusive of property exempt from execution, and over and above all his just debts and liabilities.

JONAS MEYER.
MATHIAS MEYER.

Subscribed and sworn to before me, this 29th day of September, A. D. 1877.

JOS. F. O'BEIRNE,
Com'r of the U. S. Circuit Court, District of California.

1022 (Endorsed:) United States Supreme Court. The Richmond Mining Company of Nevada vs. The Eureka Consolidated Mining Company. Bond of appeal. Approved at chambers, this Sept. 29, 1877. Lorenzo Sawyer, circuit judge.

Filed Oct. 1, 1877. T. J. Edwards, clerk U. S. Circuit Court, Dist. Nevada.

1023 In the Supreme Court of the United States.

THE RICHMOND MINING COMPANY ET AL., APPELLANTS, } Nos. 1,038
v. } and 1,039
THE EUREKA CONSOLIDATED MINING COMPANY. } and 1,040.

It is hereby stipulated and agreed that the following papers and records were used on the trial of the above-entitled cases, both at law and in equity, and that the same constitute and are part of the record on the appeals and writs of error herein:

Richmond patent.
Tip-Top patent.
Utah notice of location.
Arctic notice of location.
Antarctic notice of location.
Atlantic notice of location.

Deed from Thomas Wren to the Richmond Mining Com-
1024 pany of Nevada to the Utah claim.

Deed from R. Rickard to the Richmond Mining Company of Nevada to the Arctic claim.

Deed from Joseph Potts to the Richmond Mining Company of Nevada to the Antarctic claim.

Deed from the locator of the Atlantic claim to the Richmond Mining Company of Nevada to said claim.

Mining rules of the Eureka Mining District.
Supplemental mining rules of the Eureka Mining District.
Champion patent.
Buckeye patent.
At Last patent.
Mammoth patent.
Nuget patent.
Lupita patent.
Sentinel patent.
Savage patent.
Lookout patent.
Deed from complainant to defendant, Exhibit W.

Agreement between complainant and defendant, Exhibit H.
1025 Deeds from complainant and defendant to each other, Exhibits Y and Z.

And it is further stipulated and agreed that the clerk shall certify a transcript of the foregoing papers and records, together with this stipulation, and that the same may be annexed to the transcripts at law and in equity, and used upon the hearing and decision of the above-entitled actions.

The object of this stipulation is to supply and cure all defects and omissions in the transcripts of the record in each and all of the above-entitled causes.

March 18, 1878.

THOMAS WREN,
For Appellants and Plff's. in Error.

S. HEYDENFELDT
AND GARBER & THORNTON,
For Respondents and Defendants in Error.

1026 EXHIBIT I. 10,

General Land Office No. 885. Mineral Certificate No. 163.

United States of America. To all to whom these presents shall come, greeting:

Whereas, in pursuance of the act of Congress, approved July twenty-sixth, eighteen hundred and sixty-six, entitled "An act granting the right of way to ditch and canal owners over the public lands, and for other purposes," the act amendatory thereof, approved July ninth, eighteen hundred and seventy; and the act approved May tenth, eighteen hundred and seventy-two, entitled "An act to promote the development of the mining resources of the United States," there have been deposited in the General Land Office of the United States the plat and field-notes of survey of the claims of the Richmond Mining Company of Nevada upon the Richmond lode, accompanied by the certificate of the register of the land office at Eureka, in the State of Nevada, whereby it appears that in pursuance of said acts of Congress, the Richmond Mining Company of Nevada did, on the 30th day of August, A. D. 1872, enter and pay for said mining claim or premises, being Mineral Entry No. 163, in the series of said office, designated by the surveyor-general as lot No. 64, embracing a portion of the unsurveyed public domain, in the Eureka Mining District in the county of Eureka and State of Nevada, in the district of lands, subject to sale at Eureka, embracing three (3) acres and thirty-nine hundreths ($\frac{93}{100}$) of an acre of land, more or less, and, according to the returns on file in the General Land Office, bounded, described, and platted as follows, with magnetic variations at sixteen (16) degrees thirty (30) minutes east, to wit: Beginning at post No. 1, near the summit of Ruby Hill, the same being post No. 4 of survey No. 38, made for the claim of the Eureka Consolidated Mining Company upon Champion lode, and post No. 2 of survey No. 43, made for the Eureka Consolidated Mining Company upon the Lookout lode, from which the northwest corner of the Richmond Hoisting Works bears north sixty-two (62) degrees forty-five (45) minutes west, at the distance of five hundred and eleven (511) feet; thence from said post north thirty-four (34) degrees fifteen (15) minutes, west four hundred (400) feet to northwesterly corner of said survey No. 43 five hundred and one and one-half ($501\frac{1}{2}$) feet to post in stone monument, marked "Richmond N. E. Cor.;" thence south thirty-eight (38) degrees west three hundred (300) feet to iron pin in stone monument; thence south thirty-four (34) degrees fifteen (15) minutes, east five hundred and one and one-half ($501\frac{1}{2}$) feet to stone monument standing at base of Limestone Bluff; thence north thirty-eight (38) degrees east three hundred (300) feet to the place of beginning, containing three (3) acres and thirty-nine hundredths ($\frac{39}{100}$) of an acre of land, more or less, and embracing five hundred

one and one-half ($501\frac{1}{2}$) linear feet of the said Richmond lode, as represented by yellow shading in the following plat.

1027 Plat of the claim of the Richmond Mining Company of Nevada, upon the Richmond lode, Eureka Mining District, Eureka county, Nevada, containing $3\frac{39}{100}$ acres. Scale of 200 feet to an inch. Mag. var. 16° 30′ east.

[Here follows map, marked page 1027.]

1028 Now know ye, that the United States of America, in consideration of the premises, and in conformity with said acts of Congress, have given and granted, and by these presents do give and grant unto the said Richmond Mining Company of Nevada, and to their successors and assigns, the said mining premises hereinbefore described as lot No. 64, embracing a portion of the unsurveyed public domain, with the exclusive right of possession and enjoyment of all the land included within the exterior lines of said survey not herein expressly excepted from these presents, and of five hundred and one and one-half ($501\frac{1}{2}$) lineal feet of the said Richmond vein, lode, ledge, or deposit for the length hereinbefore described, throughout its entire depth, although it may enter the land adjoining; and also of all other veins, lodes, ledges, or deposits throughout their entire depths, the tops or apexes of which lie inside the exterior boundary lines of said survey at the surface, extended downward vertically, although such veins, lodes, ledges, or deposits in their downward course may so far depart from a perpendicular as to extend outside the vertical side lines of said survey: *Provided*, that the right of possession hereby granted to such outside parts of said veins, lodes, ledges, or deposits shall be confined to such portions thereof as lie between vertical planes drawn downward through the end lines of said survey at the surface, so continued in their own direction that such vertical planes will intersect such exterior parts of said veins, lodes, ledges, or deposits: *And provided further*, that nothing in this conveyance shall authorize the grantees herein, their successors or assigns, to enter upon the surface of a mining claim owned or possessed by another: to have and to hold said mining premises, together with all the rights, privileges, immunities, and appurtenances of whatsoever nature thereunto belonging, unto the said Richmond Mining Company of Nevada, and to their successors and assigns forever, subject, nevertheless, to the following conditions and stipulations:

First. That the grant hereby made is restricted to the land hereinbefore described as lot number 64, with five hundred and one and one-half ($504\frac{1}{2}$) lineal feet of the Richmond vein, lode, ledge, or deposit for the length aforesaid throughout its entire depth as aforesaid, together with all other veins, lodes, ledges, or deposits throughout their entire depth as aforesaid, the tops or apexes of which lie inside the exterior lines of said survey, but subject to the right of other parties to follow any vein or lode, with its dips, angles, and

variations, legally held under a location made prior to May 10, 1872.

Second. That the premises hereby conveyed, with the exception of the surface, may be entered by the proprietor of any other vein, lode, ledge, or deposit, the top or apex of which lies outside of the exterior limits of said survey, should the same in its downward course be found to penetrate, intersect, extend into, or underlie the premises hereby granted, for the purpose of extracting and removing the ore from such other vein, lode, ledge, or deposit.

Third. That the premises hereby conveyed shall be held subject to any vested and accrued water rights for mining, agricultural, manufacturing, or other purposes, and rights to ditches and reservoirs used in connection with such water rights as may be recognized and acknowledged by the local laws, customs, and decisions of courts.

Fourth. That in the absence of necessary legislation by Congress, the legislature of Nevada may provide rules for working the mining claim or premises hereby granted, involving easements, drainage, and other means, to its complete development.

In testimony whereof, I, Ulysses S. Grant, President of the United States, have caused these letters to be made patent, and the seal of the General Land Office to be hereto affixed.

Given under my hand at the city of Washington, the thirtieth day of April, in the year of our Lord one thousand eight hundred and seventy-four, and of the independence of the United States the ninety-eighth.

[SEAL.]

By the President:
U. S. GRANT,
By S. D. WILLIAMSON,
Secretary.
L. K. LIPPINETT,
Recorder of the General Land Office.

Recorded Vol. 10, pages 217 to 222. Examined.

[Endorsed:] United States to Richmond Mining Co. Mineral Certificate No. 163, Richmond Lode. Dated April 30, 1874.

Recorded at the request of J. J. Corrigan, September 12th, A. D. 1874, at 10 minutes past 11 o'clock A. M., in Liber Three of Deeds, pages 26 to 29, Eureka county, Nevada, Records.

T. J. TENNANT, *Recorder.*

1029 *Antarctic.*

I hereby claim six hundred feet of the ledge, lode, or deposit discovered in the works of the Richmond Consolidated Mining Company (limited) of London, and known as the Richmond ledge, lode, or deposit. My claim commences at a point upon said ledge, lode, or deposit perpendicularly underneath a stake and monument

one and one-half (501½) linear feet of the said Richmond lode,
Pf as represented by yellow shading in the following plat.

1027 Plat of the claim of the Richmond Mining Company of Nevada, upon the Richmond lode, Eureka Mining District, Eureka county, Nevada, containing $3\frac{39}{100}$ acres. Scale of 200 feet to an inch. Mag. var. 16° 30′ east.

[Here follows map, marked page 1027.]

1028 Now know ye, that the United States of America, in consideration of the premises, and in conformity with said acts of Congress, have given and granted, and by these presents do give and grant unto the said Richmond Mining Company of Nevada, and to their successors and assigns, the said mining premises hereinbefore described as lot No. 64, embracing a portion of the unsurveyed public domain, with the exclusive right of possession and enjoyment of all the land included within the exterior lines of said survey not herein expressly excepted from these presents, and of five hundred and one and one-half (501½) lineal feet of the said Richmond vein, lode, ledge, or deposit for the length hereinbefore described, throughout its entire depth, although it may enter the land adjoining; and also of all other veins, lodes, ledges, or deposits throughout their entire depths, the tops or apexes of which lie inside the exterior boundary lines of said survey at the surface, extended downward vertically, although such veins, lodes, ledges, or deposits in their downward course may so far depart from a perpendicular as to extend outside the vertical side lines of said survey: *Provided*, that the right of possession hereby granted to such outside parts of said veins, lodes, ledges, or deposits shall be confined to such portions thereof as lie between vertical planes drawn downward through the end lines of said survey at the surface, so continued in their own direction that such vertical planes will intersect such exterior parts of said veins, lodes, ledges, or deposits: *And provided further*, that nothing in this conveyance shall authorize the grantees herein, their successors or assigns, to enter upon the surface of a mining claim owned or possessed by another: to have and to hold said mining premises, together with all the rights, privileges, immunities, and appurtenances of whatsoever nature thereunto belonging, unto the said Richmond Mining Company of Nevada, and to their successors and assigns forever, subject, nevertheless, to the following conditions and stipulations:

First. That the grant hereby made is restricted to the land hereinbefore described as lot number 64, with five hundred and one and one-half (504½) lineal feet of the Richmond vein, lode, ledge, or deposit for the length aforesaid throughout its entire depth as aforesaid, together with all other veins, lodes, ledges, or deposits throughout their entire depth as aforesaid, the tops or apexes of which lie inside the exterior lines of said survey, but subject to the right of other parties to follow any vein or lode, with its dips, angles, and

variations, legally held under a location made prior to May 10, 1872.

Second. That the premises hereby conveyed, with the exception of the surface, may be entered by the proprietor of any other vein, lode, ledge, or deposit, the top or apex of which lies outside of the exterior limits of said survey, should the same in its downward course be found to penetrate, intersect, extend into, or underlie the premises hereby granted, for the purpose of extracting and removing the ore from such other vein, lode, ledge, or deposit.

Third. That the premises hereby conveyed shall be held subject to any vested and accrued water rights for mining, agricultural, manufacturing, or other purposes, and rights to ditches and reservoirs used in connection with such water rights as may be recognized and acknowledged by the local laws, customs, and decisions of courts.

Fourth. That in the absence of necessary legislation by Congress, the legislature of Nevada may provide rules for working the mining claim or premises hereby granted, involving easements, drainage, and other means, to its complete development.

In testimony whereof, I, Ulysses S. Grant, President of the United States, have caused these letters to be made patent, and the seal of the General Land Office to be hereto affixed.

Given under my hand at the city of Washington, the thirtieth day of April, in the year of our Lord one thousand eight hundred and seventy-four, and of the independence of the United States the ninety-eighth.

[SEAL.]

By the President:
U. S. GRANT,
By S. D. WILLIAMSON,
Secretary.
L. K. LIPPINETT,
Recorder of the General Land Office.

Recorded Vol. 10, pages 217 to 222. Examined.

[Endorsed:] United States to Richmond Mining Co. Mineral Certificate No. 163, Richmond Lode. Dated April 30, 1874.

Recorded at the request of J. J. Corrigan, September 12th, A. D. 1874, at 10 minutes past 11 o'clock A. M., in Liber Three of Deeds, pages 26 to 29, Eureka county, Nevada, Records.

T. J. TENNANT, *Recorder.*

1029 *Antarctic.*

I hereby claim six hundred feet of the ledge, lode, or deposit discovered in the works of the Richmond Consolidated Mining Company (limited) of London, and known as the Richmond ledge, lode, or deposit. My claim commences at a point upon said ledge, lode, or deposit perpendicularly underneath a stake and monument

upon which this notice is posted, whence a mountain mahogany tree with three notches in blaze bears N. 78½° E. 26 feet distant, and running thence, 1st, S. 62½° E. 600 feet to stake, thence, 2d, N. 38° E. 203 feet and 4 inches to stake, thence, 3d, N. 62½° W. 600 feet to stake, thence, 4th, S. 38° W. 203 feet and 4 inches to the place of beginning, together with all the dips, spurs, and angles of said lode, ledge, or deposit. Courses expressed from the true meridian var. 16½ E. To be known as the Antarctic ledge.

May 8th, 1874. JOHN B. McGEE.

Filed for record May 10th, 1874.

M. G. CAVANAUGH,
Mining Recorder.

1030 I hereby certify the above to be a true, full, and correct copy of the notice of location of the Antarctic ledge, as the same appears of record on page 178 in book E of the mining records of Eureka district, Nev., the same having been carefully examined and compared by me with the foregoing copy.

EUREKA, NEV., *Sept. 25th*, 1878.

M. G. CAVANAUGH,
Mining Recorder, Eureka Dis., Nev.

1031 *Atlantic.*

I hereby claim six hundred feet on the ledge, lode, or deposit discovered in the works of the Richmond Consolidated Company (limited) of London, and known as the Richmond ledge, lode, or deposit. My claim commences at the point upon said ledge, lode, or deposit perpendicularly underneath a stake and stone monument whence a small pine tree with three notches in blaze bears S. 63½° E. 42 feet distant, and running thence, 1st, S. 62½° E. 600 feet to stake, thence, 2d, N. 38° east 203 feet and four inches to stake, thence, 3d, N. 62½° W. 600 feet to stake, thence, 4th, S. 38° W. 203 feet and 4 inches to the place of beginning, together with all the dips, spurs, and angles of said ledge, lode, or deposit; courses *courses* expressed from true meridian, magn. variation 16½ E. This shall be known as the Atlantic ledge.

May 8th, 1874. THOMAS WREN.

Filed for record May 10th, 1874.

M. G. CAVANAUGH,
Mining Recorder.

1032 I hereby certify the above to be a true, full, and correct copy of the notice of location of the Atlantic lode, as the same appears of record on page 179 in book E of the Eureka district mining records, the same having been carefully examined and compared by me with the foregoing copy.

EUREKA, NEV., *Sept. 25th*, 1878.

M. G. CAVANAUGH,
Mining Recorder, Eureka Dist., Nev.

1033 "EXHIBIT F."

General Land Office No. 383. Mineral Certificate No. 108.

The United States of America. To all to whom these presents shall come, greeting:

Whereas, in pursuance of the act of Congress, approved July twenty-sixth, eighteen hundred and sixty-six, entitled "An act granting the right of way to ditch and canal owners over the public lands, and for other purposes;" the act amendatory thereof, approved July ninth, eighteen hundred and seventy; and the act approved May tenth, eighteen hundred and seventy-two, entitled "An act to promote the development of the mining resources of the United States," there have been deposited in the General Land Office of the United States the plat and field-notes of survey of the claim of the Eureka Consolidated Mining Company upon
1034 the Mammoth lode, bearing silver, accompanied by the certificate of the register of the land office at Austin, in the State of Nevada, whereby it appears that in pursuance of said acts of Congress, the Eureka Consolidated Mining Company did, on the fourth day of September, A. D. 1871, enter and pay for said mining claim or premises, being Mineral Entry No. 108, in the series of said office, designated by the surveyor-general as lot number forty-one (41), forming a portion of the unsurveyed public domain in the Eureka Mining District, in the county of Lander and State of Nevada, in the district of lands subject to sale at Austin, embracing one (1) acre and six-tenths ($\frac{6}{10}$) of an acre of land, more or less, and according to the returns on file in the General Land Office, bounded, described, and platted as follows, with magnetic variation at sixteen (16) degrees thirty (30) minutes east, to wit:

1035 Beginning at post marked "No. 1, U. S. Survey, No. 41," the same being post No. 2, of survey No. 40, made for the Eureka Consolidated Mining Company upon the Sentinel lode, from which a prominent rocky point, No. 2, the summit of Silver Hill, bears south seventy-two (72) degrees forty-two (42) minutes east, at the distance of six thousand two hundred and seventy-one (6,271) feet. The highest point of Ruby Hill, No. 1, bears north fifty-five (55) degrees twenty (20) minutes west, at the distance of eleven hundred and nine (1,109) feet. The flag-staff in the town of Eureka bears north fifty-six (56) degrees fifty-three (53) minutes east, at the distance of nine thousand seven hundred and sixty-five (9,765) feet; thence from said post, No. 1, south thirty-eight (38) degrees west fifty-four (54) feet, to post "No. 2, U. S. Sur-
1036 vey, No. 41;" thence north seventy-six (76) degrees forty-five (45) minutes west, one hundred and ten (110) feet to post marked "No. 3, U. S. Survey, No. 41;" thence north fifty-two (52) degrees west seventy-seven and one-half ($77\frac{1}{2}$) feet to post No. 1, of survey No. 37, made for the claim of the Eureka Consolidated Mining Company on the Buckeye lode, six hundred and twenty-

seven and one-half (627½) feet to post marked "No. 4, U. S. Survey, No. 41;" on northeastern boundary of said survey No. 37; thence north thirty-eight (38) degrees east one hundred (100) feet to post marked "No. 5, U. S. Survey, No. 41," the same being post No. 3, of said survey No. 40; thence south fifty-two (52) degrees east, seven hundred and twenty-seven (727) feet and one-half (½) of a foot, to the place of beginning; containing one (1) acre and six-tenths ($_{1}{}^{6}{}_{0}$) of an acre of land, more or less, as represented
1037 in the following plat: Survey No. 41. Plat of the Eureka Consolidated Mining Company's claim upon the Mammoth lode, Eureka Mining District, Lander county, Nevada, containing $1\,{}^{6}{}_{0}$ acres. Scale of 200 feet to an inch. Variation 16° 30′ east.

[Here follows map, marked page 1037.]

1038 Now know ye, that the United States of America, in consideration of the premises and in conformity with said acts of Congress, *have given and granted*, and by these presents *do give and grant* unto the said Eureka Consolidated Mining Company, and to their successors and assigns, the said mining premises hereinbefore described as lot number forty-one (41), forming a portion of the unsurveyed public domain, with the exclusive right of possession and enjoyment of all the lands included within the exterior lines of said survey not herein expressly exempted from these presents, and of seven hundred and twenty-seven and one-half linear feet of the said Mammoth vein, lode, ledge, or deposit, as hereinbefore described, throughout its entire depth, although it may enter the land adjoining, and of all veins, lodes, ledges, or deposits throughout their entire depth, the tops or apexes of which lie
1039 inside the exterior boundary lines of said survey at the surface, extended downward vertically, although such veins, lodes, ledges, or deposits in their downward course may so far depart from a perpendicular as to extend outside the vertical side lines of said survey: *Provided*, that the right of possession hereby granted to such outside parts of said veins, lodes, ledges, or deposits shall be confined to such portions thereof as lie between vertical planes drawn downward through the end lines of said survey at the surface, so continued in their own direction that such vertical planes will intersect such exterior parts of said veins, lodes, ledges, or deposits: *And provided further*, that nothing in this conveyance shall authorize the grantees herein, their successors or assigns, to enter upon
1040 the *surface* of a mining claim owned or possessed by another: *To have and to hold* said mining premises, together with all the rights, privileges, immunities, and appurtenances of whatsoever nature thereunto belonging, unto the said Eureka Consolidated Mining Company, and to their successors and assigns forever, subject, nevertheless, to the following conditions and stipulations:

First. That the grant hereby made is restricted to the land hereinbefore described as lot number forty-one (41), with seven hundred and twenty-seven and one-half linear feet of the Mammoth vein,

lode, ledge, or deposit throughout its entire depth as aforesaid, together with all other veins, lodes, ledges, or deposits throughout their entire depth as aforesaid, the tops or apexes of which
1041 lie inside of the exterior lines of said survey, and to which no valid adverse claim existed on the tenth day of May, eighteen hundred and seventy-two.

Second. That the premises hereby conveyed, with the exception of the surface, may be entered by the proprietor of any other vein, lode, ledge, or deposit, the top or apex of which lies outside of the exterior limits of said survey, should the same in its downward course be found to penetrate, intersect, extend into, or underlie the premises hereby granted, for the purpose of extracting and removing the ore from such other vein, lode, ledge, or deposit.

Third. That the premises hereby conveyed shall be subject to any vested and accrued water right for mining, agricultural, manufacturing, or other purposes, and rights to ditches and
1042 reservoirs used in connection with such water rights as may be recognized and acknowledged by the local laws, customs, and decisions of courts.

Fourth. That in the absence of necessary legislation by Congress, the legislature of Nevada may provide rules for working the mining claim or premises hereby granted, involving easements, drainage, and other necessary means to its complete development.

In testimony whereof, I, Ulysses S. Grant, President of the United States of America, have caused these letters to be made *patent*, and the *seal of the General Land Office* to be hereunto affixed.

Given under my hand at the city of Washington, the third day of July, in the year of our Lord one thousand eight hundred and seventy-two, and of the independence of the United States
1043 the ninety-sixth.

By the President:

[SEAL U. S. GENERAL LAND OFFICE.]

U. S. GRANT,
By J. PARRISH, *Secretary.*
C. B. BRYNTON,
Recorder of the General Land Office.

Recorded Vol. 4, pages 228 to 233.

Recorded at request of Wells, Fargo & Co., Oct. 1st, A. D. 1872, at 30 min. past 5 P. M., in Liber 41 of Deeds, page 500.

H. J. BIDLEMAN, *Recorder.*

1044 "EXHIBIT B."

General Land Office No. 2,068. Mineral Certificate No. 145.

The United States of America. To all to whom these presents shall come, greeting:

Whereas, in pursuance of the revised statutes of the United States, chapter six, title thirty-two, there have been deposited in the

General Land Office of the United States the plat and field-notes of survey of the claim of the Eureka Consolidated Mining Company upon the At Last lode, accompanied by the certificate of the register of the land office at Austin, in the State of Nevada, whereby it appears that in pursuance of the said revised statutes of the United States, the Eureka Consolidated Mining Company did, on the twenty-ninth day of March, A. D. 1873, enter and pay
1045 for said mining claim or premises, being Mineral Entry No. 145, in the series of said office, designated by the surveyor-general as lot number forty-seven, embracing a portion of the unsurveyed public domain in the Eureka Mining District, in the county of Eureka and State of Nevada, in the district of lands subject to sale at Eureka, formerly Austin, containing one (1) acre and seventy-seven hundredths ($1\frac{77}{100}$) of an acre of land, more or less, and according to the returns on file in the General Land Office, bounded, described, and platted as follows, with magnetic variation at sixteen (16) degrees thirty (30) minutes east, to wit:

Beginning at corner No. 1, a post marked "No. 1, U. S. Survey, No. 47," the same being corner No. 1 of survey No. 43, patented to the Eureka Consolidated Mining Company, with their claim upon the Lookout lode, from which the flag-staff in the town of
1046 Eureka bears north sixty-three (63) degrees one (1) minute east at the distance of ten thousand one hundred and forty (10,140) feet; thence from said corner No. 1 south fifty-two (52) degrees east, four hundred and ten and two-tenths ($410\frac{2}{10}$) feet to corner No. 2, a post marked "No. 2, U. S. Survey, No. 47," on northwesterly boundary of survey No. 40, patented to the Eureka Consolidated Mining Company, with their claim upon the Sentinel lode; thence south forty-nine (49) degrees (30) minutes west, along boundary of said survey No. 40, fifty-one (51) feet to corner No. 3, a post marked "No. 3, U. S. Survey, No. 47," the same being corner No. 3 of said survey No. 40, and corner No. 5 of survey No. 41, patented to the Eureka Consolidated Mining Company, with their claim upon the Mammoth lode; thence south thirty-eight (38) degrees west, one hundred (100) feet to corner No. 4, a post
1047 marked "No. 4, U. S. Survey, No. 47," the same being corner No. 4 of said survey No. 41, and on northeasterly boundary of survey No. 37, patented to the Eureka Consolidated Mining Company, with their claim upon the Buckeye lode, from which the Wind Sail shaft bears south fourteen (14) degrees fifteen (15) minutes west at the distance of one hundred and fourteen (114) feet; thence from said corner No. 5, a post marked "No. 5, U. S. Survey, No. 47," the same being corner No. 4 of said survey No. 37; thence south thirty-eight (38) degrees west along northwesterly boundary of said survey No. 37, fifty (50) feet to corner No. 6, a post marked "No. 6, U. S. Survey, No. 47," the same being corner No. 1 of survey No. 38, patented to the Eureka Consolidated Mining Company, with their claim upon the Champion lode; thence north fifty-two (52) degrees west along the

northeasterly boundary of said survey No. 38, three hundred
1048 and fifty (350) feet to corner No. 7, a post marked "No. 7, U. S. Survey, No. 47," the same being corner No. 4 of survey No. 38, and corner No. 2 of said survey No. 43, from which the highest point of Ruby Hill, No. 1, bears north fifty-one (51) degrees thirty (30) minutes east, at the distance of eighty-eight (88) feet; thence from said corner No. 7 north thirty-eight (38) degrees east, along the southeasterly boundary of said survey No. 43, two hundred (200) feet to the place of beginning; containing one (1) acre and seventy-seven hundredths ($\frac{77}{100}$) of an acre of land, more or less, and embracing four hundred (400) linear feet of said At Last lode, as represented by yellow shading in the following plat:

1049 Survey No. 47. Plat of the claim of the Eureka Consolidated Mining Company upon the At Last lode, Eureka Mining District, Eureka county, Nevada. Containing $1\frac{77}{100}$ acres. Scale of 200 feet to one inch. Variation 16° 30′ E.

[Here follows map, marked page 1049.]

1050 Now know ye, that the United States of America, in consideration of the premises, and in conformity with the said revised statutes of the United States, *have given and granted*, and by these presents *do give and* grant unto the said Eureka Consolidated Mining Company, and to their successors and assigns, the said mining premises hereinbefore described as lot number forty-seven, embracing a portion of the unsurveyed public domain, with the exclusive right of possession and enjoyment of all the land included within the exterior lines of said survey not herein expressly excepted from these presents, and of four hundred (400) linear feet of the said At-Last vein, lode, ledge, or deposit for the length hereinbefore described throughout its entire depth, although it may enter the land adjoining, and also of all other veins, lodes,
1051 ledges, or deposits throughout their entire depth, the tops or apexes of which lie inside the exterior lines of said survey at the surface, extended downward vertically, although such veins, lodes, ledges, or deposits in their downward course may so far depart from a perpendicular as to extend outside the vertical side lines of said survey: *Provided*, that the right of possession hereby granted to such outside parts of said veins, lodes, ledges, or deposits shall be confined to such portions thereof as lie between vertical planes drawn downward through the end lines of said survey at the surface, so continued in their own direction that such vertical planes will intersect such exterior parts of said veins, lodes, ledges, or deposits.

And provided further, that nothing in this conveyance shall authorize the grantees herein, their successors or assigns, to enter upon the *surface* of a mining claim owned or possessed by another:

1052 *To have and to hold* said mining premises, together with all the rights, privileges, immunities, and appurtenances of whatsoever nature thereunto belonging, unto the said Eureka Consolidated

Mining Company, and to their successors and assigns forever, subject, nevertheless, to the following conditions and stipulations:

First. That the grant hereby made is restricted to the land hereinbefore described as lot number forty-seven, with four hundred linear feet of the At-Last vein, lode, ledge, or deposit for the length aforesaid throughout its entire depth aforesaid, together with all other veins, lodes, ledges, or deposits throughout their entire depths aforesaid, the tops or apexes of which lie inside the exterior lines of said survey.

Second. That the premises hereby conveyed, with the exception of the surface, may be entered by the proprietor of any other
1053 vein, lode, ledge, or deposit, the top or apex of which lies outside the exterior limits of said survey, should the same in its downward course be found to penetrate, intersect, extend into, or underlie the premises hereby granted, for the purpose of extracting and removing the ore from such other vein, lode, ledge, or deposit.

Third. That the premises hereby conveyed shall be held subject to any vested and accrued water rights for mining, agricultural, manufacturing or other purposes, and rights to ditches and reservoirs used in connection with such water rights as may be recognized and acknowledged by the local laws, customs, and decisions of courts.

Fourth. That in the absence of necessary legislation by Congress, the legislature of Nevada may provide rules for working the mining claim or premises hereby granted, involving easements,
1054 drainage, and other necessary means to its complete development.

In testimony whereof, I, Ulysses S. Grant, President of the United States of America, have caused these letters to be made *patent*, and the *seal of the General Land Office* to be hereunto affixed.

Given under my hand at the city of Washington, the twelfth day of December, in the year of our Lord one thousand eight hundred and seventy-six, and of the independence of the United States the one hundred and first.

By the President:

[SEAL U. S. GENERAL LAND OFFICE.] U. S. GRANT,

By D. D. CONE, *Secretary.*

S. W. CLARK,

Recorder of the General Land Office.

Recorded Vol. 24, pages 288 to 293, inclusive.

1055 "EXHIBIT G."

General Land Office No. 382. Mineral Certificate No. 101.

The United States of America. To all to whom these presents shall come, greeting:

Whereas, in pursuance of the act of Congress, approved July twenty-sixth, eighteen hundred and sixty-six, entitled "An act

granting the right of way to ditch and canal owners over the public lands, and for other purposes," the act amendatory thereof, approved July ninth, eighteen hundred and seventy; and the act approved May tenth, eighteen hundred and seventy-two, entitled "An act to promote the development of the mining resources of the United States," there have been deposited in the General
1056 Land Office of the United States the plat and field-notes of survey of the claim of the Eureka Consolidated Mining Company upon the Sentinel lode, bearing silver, accompanied by the certificate of the register of the land office at Austin, in the State of Nevada, whereby it appears that in pursuance of said acts of Congress, the Eureka Consolidated Mining Company did, on the fifth day of July, A. D. 1871, enter and pay for said mining claim or premises, being Mineral Entry No. 101, in the series of said office, designated by the surveyor-general as lot number forty (40), forming a portion of the unsurveyed public domain in the Eureka Mining District, in the county of Lander and State of Nevada, in the district of lands subject to sale at Austin, embracing three (3) acres and twenty-five hundredths (25-100) of an acre of land, more or less, and according to the returns on file
1057 in the General Land Office, bounded, described, and platted as follows, with magnetic variation at sixteen (16) degrees thirty (30) minutes east, to wit:

Beginning at a post marked "No. 1, U. S. Survey, No. 40," from which a prominent rocky point, No. 2, the summit of Silver Hill bears south seventy-one (71) degrees east, at the distance of six thousand two hundred and two (6,202) feet, and the flag-staff in the town of Eureka bears north fifty-seven (57) deg. seventeen (17) minutes east, at the distance of nine thousand five hundred and seventy-five (9,575) feet; thence south thirty-eight (38) deg. west, two hundred (200) feet to post marked "No. 2, U. S. Survey, No. 40," from which post No. 1 of survey No. 37, made for the claim of the Eureka Consolidated Mining Company upon the Buckeye lode, bears north eighty-one (81) deg. thirty (30) minutes west, at the
1058 distance of two hundred and three (203) feet and one-half ($\frac{1}{2}$) of a foot; thence from said post marked "No. 2, U. S. Survey, No. 40," north fifty-two (52) deg. west, seven hundred and twenty-seven (727) feet and one-half ($\frac{1}{2}$) of a foot to post marked "No. 3, U. S. Survey, No. 40," from which the highest point of Ruby Hill, No. 1, bears north sixty-one (61) deg. thirty-nine (39) minutes west, at the distance of three hundred and eighty-five (385) feet; thence north forty-nine degrees thirty (30) minutes east, two hundred and four (204) feet to post marked "No. 4, U. S. Survey, No. 40;" thence south fifty-two (52) degrees east, six hundred and eighty-seven (687) feet and one-half ($\frac{1}{2}$) of a foot, to the place of beginning, containing three (3) acres and twenty-five hundredths (25-100) of an acre of land, as represented by the following plat: Survey No. 40. Plat of the Eureka Consolidated Mining Company's claim upon the

Sentinel lode, Eureka Mining District, Lander county, Nevada. Containing $3\frac{25}{100}$ acres. Scale of 200 feet to an inch. Variation 16° 30′ E.

[Here follows map, marked page 1059.]

1060 Now know ye, that the United States of America, in consideration of the premises and in conformity with said acts of Congress, *have given and granted*, and by these presents *do give and grant*, unto the said Eureka Consolidated Mining Company, and to their successors and assigns, the said mining premises hereinbefore described as lot number forty (40), forming a portion of the unsurveyed public domain, with the exclusive right of possession and enjoyment of all the land included within the exterior lines of said survey not herein expressly excepted from these presents, and of seven hundred and seven and one-half linear feet of the said Sentinel vein, lode, ledge, or deposit as hereinbefore described throughout its entire depth, although it may enter the land adjoining, and of all veins, lodes, ledges, or deposits throughout their entire
1061 depth, the tops or apexes of which lie inside the exterior boundary lines of said survey at the surface, extended downward vertically, although such veins, lodes, ledges, or deposits in their downward course may so far depart from a perpendicular as to extend outside the vertical side lines of said survey: *Provided*, that the right of possession hereby granted to such outside parts of said veins, lodes, ledges, or deposits shall be confined to such portions thereof as lie between vertical planes drawn downward through the end lines of said survey at the surface, so continued in their own direction that such vertical planes will intersect such exterior parts of said veins, lodes, ledges, or deposits: *And provided further*, that nothing in this conveyance shall authorize the grantees herein, their successors or assigns, to enter upon the *surface*
1062 of a mining claim owned or possessed by another: *To have and to hold* said mining premises, together with all the rights, privileges, immunities, and appurtenances of whatsoever nature thereunto belonging, unto the said Eureka Consolidated Mining Company, and to their successors and assigns forever, subject, nevertheless, to the following conditions and stipulations:

First. That the grant hereby made is restricted to the land hereinbefore described as lot number forty (40), with seven hundred and one-half linear feet of the Sentinel vein, lode, ledge, or deposit, throughout its entire depth as aforesaid, together with all other veins, lodes, ledges, or deposits throughout their entire depth as aforesaid, the tops or apexes of which lie inside of the exterior lines of said survey, and to which no valid adverse claim existed on the tenth day of May, eighteen hundred and seventy-two.

1063 *Second.* That the premises hereby conveyed, with the exception of the surface, may be entered by the proprietor of any other vein, lode, ledge, or deposit, the top or apex of which

lies outside of the exterior limits of said survey, should the same in its downward course be found to penetrate, intersect, extend into, or underlie the premises hereby granted, for the purpose of extracting and removing the ore from such other vein, lode, ledge, or deposit.

Third. That the premises hereby conveyed shall be held subject to any vested and accrued water rights for mining, agricultural, manufacturing, or other purposes, and rights to ditches and reservoirs used in connection with such water rights as may be recognized and acknowledged by the local laws, customs, and decisions of courts.

Fourth. That in the absence of necessary legislation by
1064 Congress, the legislature of Nevada may provide rules for working the mining claim or premises hereby granted, involving easements, drainage, and other necessary means to its complete development.

In testimony whereof, I, Ulysses S. Grant, President of the United States of America, have caused these letters to be made *patent*, and the *seal of the General Land Office* to be hereunto affixed.

Given under my hand at the city of Washington, the third day of July, in the year of our Lord one thousand eight hundred and seventy-two, and of the independence of the United States the ninety-sixth.

By the President:

[SEAL U. S. GENERAL LAND OFFICE.] U. S. GRANT,
By J. PARRISH, *Secretary.*
C. B. BRYNTON,
Recorder of the General Land Office.

Recorded Vol. 4, pages 222 to 227.

Recorded at request of Wells, Fargo & Co., Oct. 1st, A. D. 1872, at 30 min. past 5 P. M., in Liber 41 of Deeds, page 512.

H. J. BIDLEMAN, *Recorder.*

1065 "EXHIBIT D."

General Land Office No. 391. Mineral Certificate No. 109.

The United States of America. To all to whom these presents shall come, greeting:

Whereas, in pursuance of the act of Congress approved July twenty-sixth, eighteen hundred and sixty-six, entitled "An act granting the right of way to ditch and canal owners over the public lands, and for other purposes," the act amendatory thereof, approved July ninth, eighteen hundred and seventy; and the act approved May tenth, eighteen hundred and seventy-two, entitled "An act to promote the development of the mining resources of the United States," there have been deposited in the General Land Office of
1066 the United States the plat and field-notes of survey of the claim of the Eureka Consolidated Mining Company upon

the Savage lode, bearing silver, accompanied by the certificate of the register of the land office at Austin, in the State of Nevada, whereby it appears that in pursuance of said acts of Congress the Eureka Consolidated Mining Company did, on the fourth day of September, A. D. 1871, enter and pay for said mining claim or premises, being Mineral Entry No. 109, in the series of said office, designated by the surveyor-general as lot number forty-two (42), forming a portion of the unsurveyed public domain in the Eureka Mining District, in the county of Lander and State of Nevada, in the district of lands subject to sale at Austin, embracing one (1) acre and four-tenths ($1\frac{4}{10}$) of an acre of land, more or less, and according to the returns on file in the General Land Office, bounded,
described, and platted as follows, with magnetic variation,
1067 at sixteen (16) degrees thirty (30) minutes east, to wit:

Beginning at a post marked "No. 1, U. S. Survey, No. 42," the same being post No. 2 of survey No. 37, made for the Eureka Consolidated Mining Company upon the Buckeye lode, from which the highest point of Ruby Hill, No. 1, bears north thirty-four (34) degrees fifty-five (55) minutes west, at the distance of nine hundred and seventy-two (972) feet. A prominent rocky point, No. 2, the summit of Silver Hill, bears south seventy-five (75) degrees one (1) minute east, at the distance of six thousand five hundred and sixty-five (6,565) feet, and the flag-staff in the town of Eureka bears north fifty-seven (57) degrees ten (10) minutes east, at the distance of ten thousand one hundred and sixty-two (10,162) feet; thence from said post marked "No. 1, U. S. Survey, No. 42,"
south thirty-eight (38) degrees west, one hundred (100) feet
1068 to post marked "No. 2, U. S. Survey No. 42;" thence north fifty-two (52) degrees west, six hundred (600) feet to post marked "No. 3, U. S. Survey, No. 42;" thence north thirty-eight (38) degrees east, one hundred (100) feet to post marked "No. 4, U. S. Survey, No. 42," the same being post No. 3 of said survey No. 37 and post No. 2 of survey No. 38, made for the Eureka Consolidated Mining Company's claim upon the Champion lode; thence south fifty-two (52) degrees east, six hundred (600) feet to the place of beginning, containing one (1) acre and four-tenths ($1\frac{4}{10}$) of an
acre of land, more or less, as represented by yellow shading
1069 in the following plat: Survey No. 42. Plat of the Eureka Consolidated Mining Company's claim upon the Savage lode, Eureka Mining District, Lander county, Nevada. Containing $1\frac{4}{10}$ acres. Scale of 150 feet to an inch. Variation 16° 30′ E.

[Here follows map, marked page 1069.]

1070 Now know ye, that the United States of America, in consideration of the premises, and in conformity with said acts of Congress, *have given and granted*, and by these presents do *give and grant* unto the said Eureka Consolidated Mining Company and to their successors and assigns, the said mining premises hereinbe-

fore described as lot number forty-two (42), forming a portion of the unsurveyed public domain, with the exclusive right of possession and enjoyment of all the land included within the exterior lines of said survey not herein expressly excepted from these presents, and of six hundred (600) linear feet of the Savage vein, lode, ledge, or deposit as hereinbefore described throughout its entire depth, although it may enter the land adjoining, and of all veins, lodes, ledges, or deposits throughout their entire depth, the tops or apexes of which lie inside the exterior boundary lines of said sur-
1071 vey at the surface extended downward vertically, although such veins, lodes, ledges, or deposits in their downward course may so far depart from a perpendicular as to extend outside the vertical side lines of said survey: *Provided*, that the right of possession hereby granted to such outside parts of said veins, lodes, ledges, or deposits shall be confined to such portions thereof as lie between vertical planes drawn downward through the end lines of said survey at the surface, so continued in their own direction that such vertical planes will intersect such exterior parts of said veins, lodes, ledges, or deposits: *And provided further*, that nothing in this conveyance shall authorize the grantees herein, their successors or assigns, to enter upon the *surface* of a mining claim owned or possessed by another.

To have and to hold said mining premises, together with all
1072 the rights, privileges, immunities, and appurtenances of whatsoever nature thereunto belonging, unto the said Eureka Consolidated Mining Company, and to their successors and assigns forever, subject, nevertheless, to the following conditions and stipulations:

First. That the grant hereby made is restricted to the land hereinbefore described as lot number forty-two (42), with six hundred (600) linear feet of the Savage vein, lode, ledge, or deposit throughout its entire depth as aforesaid, together with all other veins, lodes, ledges, or deposits throughout their entire depth as aforesaid, the tops or apexes of which lie inside of the exterior lines of said survey, and to which no valid adverse claim existed on the tenth day of May, eighteen hundred and seventy-two.

Second. That the premises hereby conveyed, with the exception of the surface, may be entered by the proprietor of any other
1073 vein, lode, ledge, or deposit, the top or apex of which lies outside of the exterior limits of said survey, should the same in its downward course be found to penetrate, intersect, extend into, or underlie the premises hereby granted, for the purpose of extracting and removing the ore from such other vein, lode, ledge, or deposit.

Third. That the premises hereby conveyed shall be held subject to any vested and accrued water rights for mining, agricultural, manufacturing, or other purposes, and rights to ditches and reservoirs used in connection with such water rights as may be recog-

nized and acknowledged by the local laws, customs, and decisions of courts.

Fourth. That in the absence of necessary legislation by Congress, the legislature of Nevada may provide rules for working the mining claim or premises hereby granted, involving easements, drainage, and other necessary means to its complete development.

1074 In testimony whereof, I, Ulysses S. Grant, President of the United States of America, have caused these letters to be made *patent*, and the *seal of the General Land Office* to be hereunto affixed.

Given under my hand at the city of Washington, the sixteenth day of July, in the year of our Lord one thousand eight hundred and seventy-two, and of the independence of the United States the ninety-seventh.

By the President:

[SEAL U. S. GENERAL LAND OFFICE.] U. S. GRANT,
By Z. B. STURGUS,
Asst. Secretary.
C. B. BRYNTON,
Recorder of the General Land Office.

Recorded Vol. 4, pages 277 to 283.

Recorded at request of Wells, Fargo & Co., Oct. 1st, A. D. 1872, at 30 min. past 5 P. M., in Liber 41 of Deeds, page 506.

H. J. BIDLEMAN, *Recorder.*

1075 "EXHIBIT E."

General Land Office No. 389. Mineral Certificate No. 79.

The United States of America. To all to whom these presents shall come, greeting:

Whereas, in pursuance of the act of Congress, approved July twenty-sixth, eighteen hundred and sixty-six, entitled "An act granting the right of way to ditch and canal owners over the public lands, and for other purposes," the act amendatory thereof, approved July ninth, eighteen hundred and seventy; and the act approved May tenth, eighteen hundred and seventy-two, entitled "An act to promote the development of the mining resources of the United States," there have been deposited in the General Land Office of the United States the plat and field-notes of survey of the claim of the Eureka Consolidated Mining Company upon the Buckeye lode, bear-

1076 ing silver, accompanied by the certificate of the register of the land office at Austin, in the State of Nevada, whereby it appears that in pursuance of said acts of Congress, the Eureka Consolidated Mining Company did, on the 1st day of April, A. D. 1871, enter and pay for said mining claim or premises, being Mineral Entry No. Seventy-nine, in the series of said office, designated by the surveyor-general as lot number thirty-seven (37), forming a

portion of the unsurveyed public domain in the Eureka mining district, in the county of Lander and State of Nevada, in the district of lands subject to sale at Austin, embracing three (3) acres and five tenths (5-10) of an acre of land, more or less, and, according to the returns on file in the General Land Office, bounded, described, and platted as follows, with magnetic variation at sixteen (16) degrees thirty (30) minutes east, to wit:

Beginning at a post marked "No. 1, U. S. Survey, No.
1077 37," from which the highest point of Ruby Hill, No. 1, bears north forty-nine (49) degrees forty-eight (48) minutes west, at the distance of nine hundred and thirty (930) feet. A prominent rocky point, No. 2, the summit of Silver Hill, bears south seventy-three (73) degrees east, at the distance of six thousand four hundred and seventy-one (6,471) feet. The flag-staff in the town of Eureka bears north fifty-seven (57) degrees forty (40) minutes east, at the distance of nine thousand nine hundred and eighteen (9,918) feet, and the center of the shaft on the Tennyson lode bears south thirty-five (35) degrees west, at the distance of one hundred and fifty-six (156) feet; thence from said post marked "No. 1, U. S. Survey, No. 37," south thirty-eight (38) west, two hundred and fifty (250) feet to a post marked "No. 2, U. S. Survey, No. 37;" thence north fifty-two (52) degrees west, six hundred (600) feet to post marked "No. 3, U. S. Survey, No. 37;" thence
north thirty-eight (38) degrees east, two hundred and fifty
1078 (250) feet to post marked "No. 4, U. S. Survey, No. 37;" thence south fifty-two (52) degrees east, six hundred (600) feet to the place of beginning, containing three (3) and five-tenths (5-10) of an acre of land, more or less, as represented by yellow shading in the following plat:

1079 Survey No. 37. Plat of the Eureka Consolidated Mining Company's claim upon the Buckeye lode, Eureka Mining District, Lander county, Nevada, containing $3\frac{5}{10}$ acres. Scale of 100 feet to one inch. Variation 16° 30′ E.

[Here follows map, marked p. 1079.]

1080 Now know ye, that the United States of America, in consideration of the premises, and in conformity with said acts of Congress, *have given and granted*, and by these presents *do give and grant* unto the said Eureka Consolidated Mining Company, and to their successors and assigns, the said mining premises hereinbefore described as lot number thirty-seven (37), forming a portion of the unsurveyed public domain, with the exclusive right of possession and enjoyment of all the land included within the exterior lines of said survey not herein expressly excepted from these presents, and of six hundred (600) linear feet of the said Buckeye vein, lode, ledge, or deposit as hereinbefore described throughout its entire depth, although it may enter the land adjoining, and of all veins, lodes, ledges, or deposits throughout their entire depth,

the tops or apexes of which lie inside the exterior boundary
1081 lines of said survey at the surface extended downward vertically, although such veins, lodes, ledges, or deposits in their downward course may so far depart from a perpendicular as to extend outside the vertical side lines of said survey: *Provided*, that the right of possession hereby granted to such outside parts of said veins, lodes, ledges, or deposits shall be confined to such portions thereof as lie between vertical planes drawn downward through the end lines of said survey at the surface, so continued in their own direction that such vertical planes will intersect such exterior parts of said veins, lodes, ledges, or deposits: *And provided further*, that nothing in this conveyance shall authorize the grantees herein, their successors or assigns, to enter upon the *surface* of a mining claim owned or possessed by another: *To have and to hold* said mining premises, together with all the rights, privileges, immuni-
1082 ties, and appurtenances of whatsoever nature thereunto belonging, unto the said Eureka Consolidated Mining Company, and to their successors and assigns forever, subject, nevertheless, to the following conditions and stipulations:

First. That the grant hereby made is restricted to the land hereinbefore described as lot number thirty-seven (37), with six hundred (600) linear feet of the Buckeye vein, lode, ledge, or deposit throughout its entire depth as aforesaid, together with all other veins, lodes, ledges, or deposits throughout their entire depth as aforesaid, the tops or apexes of which lie inside of the exterior lines of said survey, and to which no valid adverse claim existed on the tenth day of May, eighteen hundred and seventy-two.

Second. That the premises hereby conveyed, with the exception of the surface, may be entered by the proprietor of any other
1083 vein, lode, ledge, or deposit, the top or apex of which lies outside of the exterior limits of said survey, should the same in its downward course be found to penetrate, intersect, extend into, or underlie the premises hereby granted, for the purpose of extracting and removing the ore from such other vein, lode, ledge, or deposit.

Third. That the premises hereby conveyed shall be held subject to any vested and accrued water rights for mining, agricultural, manufacturing, or other purposes, and rights to ditches and reservoirs used in connection with such water rights as may be recognized and acknowledged by the local laws, customs, and decisions of courts.

Fourth. That in the absence of necessary legislation by Congress, the legislature of Nevada may provide rules for working the mining claim or premises hereby granted, involving easements, drainage, and other necessary means to its complete development.

1084 In testimony whereof, I, Ulysses S. Grant, President of the United States of America, have caused these letters to be made *patent*, and the *seal of the General Land Office* to be hereunto affixed.

Given under my hand at the city of Washington, the sixteenth day of July, in the year of our Lord one thousand eight hundred and seventy-two, and of the independence of the United States the ninety-seventh.

By the President: U. S. GRANT,

{ SEAL U. S. GENERAL LAND OFFICE. } By Z. B. STURGUS, *Asst. Secretary.*

C. B. BRYNTON, *Recorder of the General Land Office.*

Recorded Vol. 4, pages 263 to 269.

Recorded at request of Wells, Fargo & Co., Oct. 1st, A. D. 1872, at 30 min. past 5 P. M., in Liber 41 of Deeds, page 509.

H. J. BIDLEMAN, *Recorder.*

1085 "EXHIBIT A."

General Land Office No. 390. Mineral Certificate No. 80.

The United States of America. To all to whom these presents shall come, greeting:

Whereas, in pursuance of the act of Congress, approved July twenty-sixth, eighteen hundred and sixty-six, entitled "An act granting the right of way to ditch and canal owners over the public lands, and for other purposes," the act amendatory thereof, approved July ninth, eighteen hundred and seventy; and the act approved May tenth, eighteen hundred and seventy-two, entitled "An act to promote the development of the mining resources of the United States," there have been deposited in the General Land Office of the United States the plat and field-notes of survey of the claim of the Eureka Consolidated Mining Company upon the Champion lode, bearing silver, accompanied by the certificate of the register of the land office at Austin, in the State of Nevada, whereby it appears that in pursuance of said acts of Congress, the Eureka Consolidated Mining Company did, on the first day of April, A. D. 1871, enter and pay for said mining claim or premises, being Mineral Entry No. Eighty, in the series of said office, designated by the surveyor-general as lot number thirty-eight (38), forming a portion of the unsurveyed public domain in the Eureka Mining District in the county of Lander and State of Nevada, in the district of lands subject to sale at Austin, embracing one (1) acre and six-tenths (6-10) of an acre of land, more or less, and according to the returns on file in the General Land Office, bounded, described, and platted as follows, with magnetic variation at sixteen (16) degrees thirty (30) minutes east, to wit:

Beginning at a post marked "No. 1, U. S. Survey, No. 38," from which a prominent rocky point, No. 2, the summit of Silver Hill, bears south seventy-one (71) degrees thirty-seven (37) minutes east, at the distance of seven thousand and fifty-one (7,051) feet. The

flag-staff in the town of Eureka bears north sixty (60) degrees forty-six (46) minutes east, at the distance of ten thousand one hundred and seventy-nine (10,179) feet, and post No. 4 of survey No. 37, made for the claim of the Eureka Consolidated Mining Company upon the Buckeye lode, bears north thirty-eight (38) degrees east, at the distance of fifty (50) feet; thence from said post marked "No. 1, U. S. Survey, No. 38," south thirty-eight (38) degrees, west along the northwestern boundary of said survey No. 37, two hundred (200) feet to post marked "No. 2, U. S. Survey, No. 38," the same being post No. 3 of said survey No. 37; thence north fifty-two (52) degrees west, three hundred and fifty (350) feet to post marked "No. 3, U. S. Survey, No. 38;" thence north thirty-eight (38) degrees east, two hundred (200) feet to post marked "No. 4, U. S. Survey, No. 38," from which the highest point of Ruby Hill, No. 1, bears north fifty-one (51) degrees thirty (30) minutes east, at the distance of eighty-eight (88) feet; thence south fifty-two (52) degrees east, three hundred and fifty (350) feet to the place of beginning, containing one (1) acre and six-tenths (6-10) of an acre of land, more or less, as represented by yellow shading in the following plat:

[Here follows map, marked page 1086.]

1087 Now know ye, that the United States of America, in consideration of the premises, and in conformity with the said revised statutes, *have given and granted*, and by these presents *do give and grant* unto the said Eureka Consolidated Mining Company, and to their successors and assigns, the said mining premises hereinbefore described as lots Nos. 49 A and 49 B, embracing a portion of the unsurveyed public domain, with the exclusive right of possession and enjoyment of all the land included within the exterior lines of said survey not herein expressly excepted from these presents, and of eight hundred and five and twenty-hundredths ($805\frac{20}{100}$) linear feet of the said Lupita mine, vein, lode, ledge, or deposit, as hereinbefore described, throughout its entire depth, although it may enter the land adjoining, and of all veins, lodes, ledges, or deposits throughout their entire depth, the tops or apexes of which lie inside the exterior boundary lines of said survey at the surface extended downward vertically, although such veins, lodes, ledges, or deposits in their downward course may so far depart from a perpendicular as to extend outside the vertical side lines of said survey: *Provided*, that the right of possession hereby granted to such outside parts of said veins, lodes, ledges, or deposits shall be confined to such portions thereof as lie between vertical planes drawn downward through the end lines of said survey at the surface, so continued in their own direction that such vertical planes will intersect such exterior parts of said veins, lodes, ledges, or deposits: *And provided further*, that nothing in this conveyance shall authorize the grantees herein, their successors or assigns, to enter upon the *surface* of a mining claim owned or possessed by another: *To have and to hold*

said mining premises, together with all the rights, privileges, immunities, and appurtenances of whatsoever nature thereunto belonging, unto the said Eureka Consolidated Mining Company, and to their successors and assigns forever, subject, nevertheless, to the following conditions and stipulations:

First. That the grant hereby made is restricted to the land hereinbefore described as lot number thirty-eight (38), with three hundred and fifty (350) linear feet of the *Champion* vein, lode, ledge, or deposit throughout its entire depth as aforesaid, together with all other veins, lodes, ledges, or deposits throughout their entire depth as aforesaid, the tops or apexes of which lie inside of the exterior lines of said survey, and to which no valid adverse claim existed on the tenth day of May, eighteen hundred and seventy-two.

Second. That the premises hereby conveyed, with the exception of the surface, may be entered by the proprietor of any other vein, lode, ledge, or deposit, the top or apex of which lies outside of the exterior limits of said survey, should the same in its downward course be found to penetrate, intersect, extend into, or underlie the premises hereby granted, for the purpose of extracting and removing the ore from such other vein, lode, ledge, or deposit.

Third. That the premises hereby conveyed shall be held subject to any vested and accrued water rights for mining, agricultural, manufacturing, or other purposes, and rights to ditches and reservoirs used in connection with such water rights as may be recognized and acknowledged by the local laws, customs, and decisions of courts.

Fourth. That in the absence of necessary legislation by Congress, the legislature of Nevada may provide rules for working the mining claim or premises hereby granted, involving easements, drainage, and other necessary means to its complete development.

In testimony whereof, I, Ulysses S. Grant, President of the United States of America, have caused these letters to be made *patent*, and the *seal of the General Land Office* to be hereunto affixed.

Given under my hand at the city of Washington, the sixteenth day of July, in the year of our Lord one thousand eight hundred and seventy-two, and of the independence of the United States the ninety-seventh.

By the President:

[SEAL U. S. LAND OFFICE.]

U. S. GRANT,
By Z. B. STURGUS,
Asst. Secretary.
C. B. BRYNTON,
Recorder of the General Land Office.

Recorded Vol. 4, pages 270 to 276.

Recorded at request of Wells, Fargo & Co., Oct. 1st, A. D. 1872, at 30 min. past 5 P. M., in Liber 41 of Deeds, page 503.

H. J. BIDLEMAN, *Recorder.*

1088 "EXHIBIT C."

General Land Office No. 2,066. Mineral Certificate No. 144.

The United States of America. To all to whom these presents shall come, greeting:

Whereas, in pursuance of the provisions of the revised statutes of the United States, chapter six, title thirty-two, there have been deposited in General Land Office of the United States the plat and field-notes of the survey of the claim of the Eureka Consolidated Mining Company upon the Nuget lode, accompanied by the certificate of the register of the land office at Austin, in the State of Nevada, whereby is appears that in pursuance of the said revised statutes of the United States, the Eureka Consolidated Mining Company did, on the twenty-ninth day of March, A. D. 1873, enter and pay for said mining claim or premises, being Mineral Entry
1089 No. 144, in the series of said office, designated by the surveyor-general as lot number forty-six, embracing a portion of the unsurveyed public domain in the Eureka Mining District, in the county of Eureka and State of Nevada, in the district of lands subject to sale at Eureka, formerly Austin, containing forty-four hundredths (44-100) of an acre of land, more or less, and, according to the returns on file in the General Land Office, bounded, described, and platted as follows, with magnetic variation at sixteen (16) degrees thirty (30) minutes east, to wit:

Beginning at corner No. 1, a post marked "No. 1 U. S. Survey, No. 46," the same being corner No. 3 of survey No. 37, patented to the Eureka Consolidated Mining Company, with their claim upon the Buckeye lode, corner No. 2 of survey No. 38, patented to the Eureka Consolidated Mining Company, with their claim upon the Champion lode, and corner No. 4, of survey No. 42, patented to the Eureka Consolidated Mining Company, with their
1090 claim upon the Savage lode, from which Ruby Hill bears north eleven (11) degrees west at the distance of four hundred and thirty-six (436) feet; flag-staff in the town of Eureka bears north (60) sixty degrees eighteen (18) minutes east at the distance of ten thousand three hundred and seventy (10,370) feet; Keyes' shaft bears south seventy-seven (77) degrees thirty (30) minutes east at the distance of five hundred and sixteen (516) feet, and the Nuget shaft bears north sixty-five (65) degrees thirty (30) minutes west at the distance of sixty (60) feet; thence from said corner No. 1 south thirty-eight (38) degrees west, along boundary of said survey No. 42, one hundred (100) feet to corner No. 2, a post marked "No. 2, U. S. Survey, No. 46," the same being corner No. 3 of said survey No. 42; thence north fifty-two degrees west, one hundred and eighty-five and four-tenths ($185\frac{4}{10}$) feet to corner No. 3, an iron pin in road; thence north twenty-eight (28) degrees thirty (30)
1091 minutes east, one hundred and one and four-tenths ($101\frac{4}{10}$) feet to corner No. 4, a post marked "No. 4, U. S. Survey.

No. 46;" thence south fifty-two (52) degrees east, along southwesterly boundary of said survey No. 38, two hundred and two and four-tenths ($202\frac{4}{10}$) feet, to the place of beginning, containing forty-four hundredths (44-100) of an acre of land, more or less, and embracing two hundred and two and two-tenths ($202\frac{2}{10}$) linear feet of said Nuget lode, to wit: one hundred and forty-four (144) linear feet northwesterly, and fifty-eight and two-tenths ($58\frac{2}{10}$) linear feet southeasterly from the Nuget shaft, as represented by yel-
1092 low shading in the following plat: Survey No. 46. Plat of the claim of the Eureka Consolidated Mining Company upon the Nuget lode, Eureka Mining District, Eureka County, Nevada. Containing $\frac{44}{100}$ of an acre. Scale of 100 feet to an inch. Variation 16° 30′ E.

[Here follows map, marked page 1092.]

1093 Now know ye, that the United States of America, in consideration of the premises and in conformity with the said revised statutes of the United States, *have given and granted*, and by these presents *do give and grant* unto the said Eureka Consolidated Mining Company, and to their successors and assigns, the said mining premises hereinbefore described as lot number forty-six, forming a portion of the unsurveyed public domain, with the exclusive right of possession and enjoyment of all the lands included within the exterior lines of said survey not herein expressly excepted from these presents, and of two hundred and two and two-tenths ($202\frac{2}{10}$) linear feet of the said Nuget vein, lode, ledge, or deposit, for the length hereinbefore described, throughout its entire depth, alt'hough it may enter the land adjoining, and also of all other veins, lodes, ledges,
or deposits throughout their entire depth, the tops or apexes
1094 of which lie inside the exterior lines of said survey at the surface extended downward vertically, although such veins, lodes, ledges, or deposits in their downward course may so far depart from a perpendicular as to extend outside the vertical side lines of said survey: *Provided*, that the right of possession hereby granted to such outside parts of said veins, lodes, ledges, or deposits shall be confined to such portions thereof as lie between vertical planes drawn downward through the end lines of said survey at the surface, so continued in their own direction that such vertical planes will intersect such exterior parts of said veins, lodes, ledges, or deposits: *And provided further*, that nothing in this conveyance shall authorize the grantees herein, their successors or assigns, to enter upon the *surface* of a mining claim owned or possessed by another:
1095 *To have and to hold* said mining premises, together with all the rights, privileges, immunities, and appurtenances of whatsoever nature thereunto belonging, unto the said Eureka Consolidated Mining Company, and to their successors and assigns forever, subject, nevertheless, to the following conditions and stipulations:

First. That the grant hereby made is restricted to the land hereinbefore described as lot number forty-six, with two hundred and two and two-tenths ($202\frac{2}{10}$) linear feet of the Nuget vein, lode, ledge, or deposit for the length aforesaid throughout its entire depth as aforesaid, together with all other veins, lodes, ledges, or deposits throughout their entire depth as aforesaid, the tops or apexes of which lie inside the exterior lines of said survey.

Second. That the premises hereby conveyed, with the exception of the surface, may be entered by the proprietor of any other
1096 vein, lode, ledge, or deposit, the top or apex of which lies outside the exterior limits of said survey, should the same in its downward course be found to penetrate, intersect, extend into, or underlie the premises hereby granted, for the purpose of extracting and removing the ore from such other vein, lode, ledge, or deposit.

Third. That the premises hereby conveyed shall be held subject to any vested and accrued water rights for mining, agricultural, manufacturing, or other purposes, and rights to ditches and reservoirs used in connection with such water rights as may be recognized and acknowledged by the local laws, customs, and decisions of courts.

Fourth. That in the absence of necessary legislation by Congress, the legislature of Nevada may provide rules for working the mining claim or premises hereby granted, involving easements,
1097 drainage, and other necessary means to its complete development.

In testimony whereof, I, Ulysses S. Grant, President of the United States of America, have caused these letters to be made *patent*, and the *seal of the General Land Office* to be hereunto affixed.

Given under my hand at the city of Washington, the twelfth day of December, in the year of our Lord one thousand eight hundred and seventy-six, and of the independence of the United States the one hundred and first.

By the President:

[SEAL OF U. S. GENERAL LAND OFFICE.] U. S. GRANT,

By D. D. CONE, *Secretary.*

S. W. CLARK,

Recorder of the General Land Office.

Recorded Vol. 24, pages 276 to 281 inclusive.

1098 "EXHIBIT A."

Arctic.

I hereby claim six hundred feet on this ledge, lode, or deposit discovered in the works of the Richmond Consolidated Mining Company (limited) of London, and known as the Richmond ledge, lode, or deposit. My claim commences at a point upon said ledge, lode, or deposit perpendicularly underneath a stake and stone monument whence a small pine tree with three notches in blaze bears

S. 63½° E. 42 feet distant, and running thence, 1st, S. 62½° E. 600 feet to stake; thence, 2d, S. 38° W. 203 feet and four inches to a stake; thence, 3d, N. 62½° W. 600 feet to a stake; thence N. 38° E. 203 feet and four inches to the place of beginning, together with all the dips, spurs, and angles of said ledge, lode, or deposit. Courses expressed from true meridian. Mag. Var. 16½° E.

R. RICKARD.

To be known as the Arctic ledge.

Filed for record October 4th, 1876.

M. G. CAVANAUGH,
Mining Recorder.

1099 "EXHIBIT Z."

RICHMOND MINING CO. OF NEVADA
TO
EUREKA CONSOLIDATED MINING COMPANY.

This indenture, made the sixteenth day of June, in the year of our Lord one thousand eight hundred and seventy-three, between the Richmond Mining Company of Nevada, a corporation organized under the laws of the State of Nevada, the party of the first part, and the Eureka Consolidated Mining Company, a corporation organized under the laws of the State of California, the party of the second part, witnesseth, that the said party of the first part for and in consideration of the sum of five dollars, gold coin of the United States of America, to it in hand paid by the said party of the second part, the receipt whereof is hereby acknowledged, hath granted, bargained, sold, remised, released, and forever quit-claimed, and by these presents doth grant, bargain, sell, remise, release, and forever quit-claim unto the said party of the second part, and to its successors and assigns, all the mining ground situate and being in the Eureka Mining District, Eureka county, State of Nevada, and lying on the southeasterly side of the following line, to wit:

Commencing at the northeasterly corner of the Margaret mining ground or claim, which corner is marked "X" on the map or plan annexed to a certain agreement bearing even date with this indenture, made and entered into by and between the said Eureka Consolidated Mining Company of the first part, and the said Richmond Mining Company of Nevada, of the second part; running thence in a southwesterly direction along the edge of the said "Margaret ground," the "At last ground," and the "Champion ground," to a point marked "W" on said map; thence southerly along the edge of the said "Champion ground" to the northeasterly corner of the "Nugget ground;" thence in a southwesterly direction along the edge of the said "Nugget ground" to the northwesterly corner of the said "Nugget ground," at the point marked "R" on said map.

Together with all the dips, spurs, and angles, and also all the metals, ores, gold and silver-bearing quartz, rock, and earth therein;

and all the rights, privileges, and franchises thereto incident, appendant and appurtenant, or therewith usually had and enjoyed; and also all and singular the tenements, hereditaments, and appurtenances thereto belonging or in anywise appertaining, and the rents, issues, and profits thereof; and also all the estate, right, title, interest, property, possession, claim, and demand whatsoever, as well in law as in equity, of the said party of the first part, of, in, or to the said premises, and every part and parcel thereof, with the appurtenances.

To have and to hold all and singular the said premises, together with the appurtenances and privileges thereto incident, unto the said party of the second part, its successors and assigns, forever.

In witness whereof, the said party of the first part has hereunto set its hand and seal, the day and year first above written.

RICHMOND MINING CO. OF NEVADA,
By its President, J. J. CORRIGAN. [SEAL.]

Signed, sealed, and delivered in presence of F. J. Thibault.

UNITED STATES OF AMERICA.

STATE OF CALIFORNIA,
CITY AND COUNTY OF SAN FRANCISCO. } *ss.*

I, F. J. Thibault, a commissioner for the State of Nevada, duly commissioned and qualified under and by virtue of the laws thereof, residing in the city and county of San Francisco, State of California, do certify that on the seventeenth day of June, A. D. one thousand eight hundred and seventy-three, before me personally appeared J. J. Corrigan, known to me to be the president of the Richmond Mining Company of Nevada, a corporation duly organized under the laws of the State of Nevada, who is personally known to me to be the individual described in, whose name is subscribed to, and who executed the within instrument, the said Richmond Mining Company of Nevada, being named in said instrument, and known to me to be the corporation described therein as a party thereto; and he, the said J. J. Corrigan duly acknowledged to me that he executed the same as such president as and for the act and deed of said Richmond Mining Company of Nevada, and that said corporation executed the same freely and voluntarily for the uses and purposes therein mentioned, and that the seal that is thereto affixed is the corporate seal of said corporation, and was thereto affixed by authority thereof.

In witness whereof, I have hereunto set my hand and affixed my official seal as such commissioner, at my office in the city and county of San Francisco, in the State of California, this seventeenth (17th) day of June, A. D. 1873.

[COMMISSIONER'S SEAL.] F. J. THIBAULT,
Commissioner for Nevada in California.

Recorded at request of P. L. Buckminster, Aug. 19, A. D. 1873, at 15 min. past 9 o'clock A. M.

A. J. CAMPBELL, *Recorder.*

Book 1 of Deeds, pages 105, 106, 107, Records of Eureka County, Nevada.

1100 "EXHIBIT X."

EUREKA CONSOLIDATED MINING COMPANY
and
RICHMOND MINING COMPANY OF NEVADA.

This agreement, made the sixteenth day of June, A. D. one thousand eight hundred and seventy-three, between the Eureka Consolidated Mining Company, a corporation organized under the laws of the State of California, of the first part, and the Richmond Mining Company of Nevada, a corporation organized under the laws of the State of Nevada, of the second part.

Whereas, differences have arisen and now exist between the parties hereto, in respect to the ownership and right of possession of certain mining ground, known as the Lookout ground or claim, situate in the Eureka Mining District in the county of Eureka, State of Nevada, and of the ores, metals, and deposits found in and under the said ground; and whereas, an action is, or certain actions are, now pending in the courts of the State of Nevada, where the party hereto of the first part is the plaintiff, and the party hereto of the second part and others, are the defendants; for the recovery, among other things, of the possession of the ground and of the ores therein contained, or which have been taken therefrom by the defendants, in which action a bond has, or bonds have been entered into or given by and on behalf of the plaintiff, upon an application by the said plaintiff for an injunction, or restraining order against the said defendants or some of them, and also, upon a claim and delivery of personal property by said plaintiff; and whereas, the said parties have agreed to settle all the differences between them and put an end to the litigation now pending as aforesaid.

Now, therefore, this agreement witnesseth, that the said party of the first part, for and in consideration of the sum of eighty-five thousand dollars, gold coin of the United States, to be paid by said party of the second part, at the times and in the manner hereinafter set forth, and the further covenants, agreements, and conditions hereinafter contained, to be kept, performed, and observed by, and on the part of the said party of the second part, have agreed, and do hereby agree to convey to the said party of the second part, its successors and assigns, with warranty against their own acts, all that certain lot, piece, or parcel of land, or mining ground, situate in the Eureka Mining District, county of Eureka, State of Nevada, and known as the Lookout ground or claim; and also, all the mining

ground and claim lying on the northwesterly side of a certain line commencing at the northeasterly corner of the Margaret mining ground or claim, which corner is marked × on the map or plan hereto annexed, and made part of this agreement; running thence in a southwesterly direction along the edge of said Margaret ground, the At Last ground, and the Champion ground, to a point marked W on said map; thence southerly along the edge of said Champion ground, to the northeasterly corner of the Nugget ground; thence in a southwesterly direction along the edge of said Nugget ground, to the northwesterly corner thereof, at the point marked R on said map or plan, together with all the ores, precious metals, including those now lying on the dump at the "Lookout Shaft," and all veins, lodes, ledges, deposits, dips, spurs, or angles on, in, or under the same contained; and to dismiss all the said actions now pending in the courts of the State of Nevada, between the parties hereto, in respect to the said land or mining claim, and the ores, precious metals, veins, lodes, ledges, deposits, dips, spurs, and angles, on, in, or under the same, or which may have been taken from the said land or mining ground, and to release the said party of the second part, and all persons acting for it or in its behalf, from all claims and demands in respect to the said land or mining ground, and to the ores, precious metals, veins, lodes, ledges, deposits, dips, spurs, or angles, now or heretofore found in or under the same. And the said party of the first part further agrees not to protest against or put any obstacle in the way of the party of the second part in their application for a United States patent to the Richmond or other lodes or veins, provided each application do not conflict or cross the aforesaid line agreed upon; and the said party of the second part, in consideration of the premises, hath agreed and doth hereby agree to pay to the said party of the first part, its successors or assigns, the said sum of eighty-five thousand dollars, in gold coin of the United States, in manner following, that is to say:

On the execution hereof, the sum of twenty-five thousand dollars; on the sixteenth day of July, one thousand eight hundred and seventy-three, the sum of twenty-five thousand dollars; on the sixteenth day of August next following, the sum of twenty-five thousand dollars; and on the sixteenth day of September next following, the sum of ten thousand dollars, for all of which payments, except the first, the said party of the second part is to give its promissory notes.

And the said party of the second part, for the consideration aforesaid, hath further agreed, and doth hereby further agree, to release and discharge, and doth hereby release and discharge the said party of the first part, its successors and assigns and its sureties, from all claims and demands, whether for damages, compensation, or indemnity, or otherwise, or under or by reason of any bond or undertaking, made, given, or entered into by or on behalf of the said party of the first part, in any action or suit now or heretofore pending o

1 ubsisting in respect to the said land or mining ground, or the ores, recious metals, veins, lodes, ledges, deposits, dips, spurs, or angles, ow or heretofore found in or under the same, and from any act, thing, or proceeding done or taken by or on behalf of the said party of the first part, in any such actions or suits. And the said party of the second part, for the consideration aforesaid, hath further agreed and doth hereby further agree, to convey unto the said party of the first part, with warranty against its own acts, all its right, title, or interest in and to any and all the land or mining ground situate in the Eureka Mining District aforesaid, on the southeasterly side of the line hereinbefore mentioned, and laid down on the said map hereto annexed, and in and to all ores, precious metals, veins, lodes, ledges, deposits, dips, spurs, or angles, on, in, or under the said land or mining ground, or any part thereof. It being the object and intention of the said parties hereto to confine the workings of the party of the second part to the northwesterly side of the said line continued downward to the centre of the earth, which line is hereby agreed upon as the permanent boundary line between the claims of the said parties.

And it is hereby mutually agreed that the notes to be given party, and the deeds and conveyances heretofore provided for, shall be upon the execution of these presents, deposited with D. O. Mills and W. C. Ralston, in the Bank of California, of San Francisco, there to remain until all the said notes shall have been paid and taken up, upon the happening of which event the said deeds and conveyances are to be delivered by the said Mills and Ralston, or either of them, to the respective grantees therein named, their successors or assigns. It is the understanding of the parties hereto that the actions hereintofore recited, are to be forthwith dismissed, and that the party of the second part is to remain in possession of the Lookout ground aforesaid, and at its option work the same from this date.

1101 In witness whereof, the parties hereto have caused these presents to be signed by their respective presidents and secretaries, and their respective corporate seals to be hereunto affixed.

EUREKA CONSOLIDATED MINING COMPANY.

{ EUREKA CON. MINING CO.—INCORPORATED. } By its President, G. T. LAWTON. [SEAL.]

RICHMOND MINING COMPANY OF NEVADA,

{ RICHMOND.—INCORPORATED. } By its President, J. J. CORRIGAN. [SEAL.]
W. W. TRAYLOR, *Secretary.* [SEAL.]

UNITED STATES OF AMERICA.

STATE OF CALIFORNIA, }
CITY AND COUNTY OF SAN FRANCISCO. } *ss.*

I, F. J. Thibault, a Commissioner of—for the State of Nevada, uly commissioner and qualified, under and by virtue of the laws

thereof, residing in the city and county of San Francisco, State of California, do certify that on the seventeenth day of June, A. D. one thousand eight hundred and seventy-three, before me personally appeared G. T. Lawton, known to me to be the president, and W. W. Traylor, known to me to be the secretary of the Eureka Consolidated Mining Company, a corporation duly organized under the laws of the State of California, who are personally known to me to be the individuals described in, who executed, and whose names are subscribed to the foregoing instrument. The said Eureka Consolidated Mining Company being named in said instrument, and known to me to be the corporation described therein as a party thereto. And they, the said G. T. Lawton and W. W. Traylor, duly acknowledged to me that they executed the same as such president and secretary, as and for the act and deed of said Eureka Consolidated Mining Company, and that the said corporation executed the same freely and voluntarily, for the uses and purposes therein mentioned, and that the seal which is hereto affixed is the corporate seal of said company, and was thereto affixed by authority thereof. And on the same day before me, personally appeared J. J. Corrigan, known to me to be the president of the Richmond Mining Company of Nevada, a corporation duly organized under the laws of the State of Nevada, personally known to me to be the individual described in, who executed and whose name is subscribed to the foregoing instrument, said Richmond Mining Company of Nevada, being named in said instrument and known to me to be the corporation described therein as a party thereto. And he, the said J. J. Corrigan, duly acknowledged to me that he executed the same as such president, as and for the act and deed of said Richmond Mining Company of Nevada, and that said corporation executed the same freely and voluntarily, for the uses and purposes therein mentioned. And that the seal which is thereto affixed is the corporate seal of said corporation, and was thereto affixed by authority thereof.

In witness whereof, I have hereunto set my hand and affixed my official seal as such commissioner, at my office in the city and county of San Francisco, State of California, this seventeenth day of June, A. D. 1873.

F. J. THIBAULT,
Commissioner for Nevada in California.

Endorsed: Agreement. Dated June 16th, 1873. Filed and recorded at request of Wells, Fargo & Co., June 20, 1873, at 35 minutes past 10 A. M. A. J. Campbell, recorder. By J. C. Maupin, deputy.

Book A, Miscellaneous Records, pp. 38–39–40–41–42, Records of Eureka county.

[Here follows map, marked page 1102.]

1103 EXHIBIT VII.

This indenture, made the twenty-fourth day of October, in the year of our Lord one thousand eight hundred and seventy-six (1876), between Joseph Potts, of Ruby Hill, Eureka county, Nevada, the party of the first part, and the Richmond Mining Company of Nevada, a corporation organized and existing under the laws of the State of Nevada, the party of the second part, witnesseth, that the said party of the first part, for and in consideration of the sum of one thousand ($1,000) dollars, gold coin of the United States of America, to him in hand paid by the said party of the second part, the receipt whereof is hereby acknowledged, has granted, bargained, sold, remised, released, and forever quit-claimed, and by these presents does grant, bargain, sell, remise, release, and forever quit-claim unto the said party of the second part, and to its successors and assigns forever, the following described quartz lodes and mining claims situate, lying, and being in the Eureka Mining District, county of Eureka, and State of Nevada, known as and described as follows: The Cliff lode, containing 1,500 feet, situate on Ruby Hill, on the north side thereof, and lying east and northeast of the Antarctic claim or lode; the Utah, number two, on the north side of Ruby Hill and south of the Utah, number one, near the Bell shaft; the Pacific lode northwest of the Skylark, containing one thousand feet; together with all the dips, spurs, and angles, and also all the metals, ores, gold and silver bearing quartz, rock, and earth therein; and the rights, privileges, and franchises thereto incident, appendant, and appurtenant, or therewith usually had and enjoyed; and also all and singular the tenements, hereditaments, and appurtenances thereto belonging or in anywise appertaining, and the rents, issues, and profits thereof; and also all the estate, rights, title, interest, property, possession, claim, and demand whatsoever, as well in law as in equity, of the said party of the first part, of, in, or to the said premises, and every part and parcel thereof, with the appurtenances: To have and to hold all and singular the said premises, together with the appurtenances and privileges thereto incident unto the said party of the second part, heirs and assigns, forever.

In witness whereof, the said party of the first part has hereunto set his hand and seal, the day and year first above written.

[SEAL.] JOSEPH POTTS.

STATE OF NEVADA, } ss.
COUNTY OF EUREKA. }

On this first day of November, A. D. one thousand eight hundred and seventy-six, personally appeared before me, T. Laspeyre, a notary public in and for the county of Eureka, Joseph Potts, whose name is subscribed to the annexed instrument as a party thereto, personally known to me to be the same person described in and who executed the said annexed instrument as a party thereto;

and the said Joseph Potts duly acknowledged to me that he executed the same freely and voluntarily and for the uses and purposes therein mentioned.

In witness whereof, I have hereunto set my hand and affixed my official seal, the day and year in this certificate first above written.

[NOTARIAL SEAL.] T. LASPEYRE,
Notary Public.

Endorsed as follows: Deed. Joseph Potts to Richmond Mining Company of Nevada. Recorded at the request R. K. Morrison, November 28th, A. D. 1876, at 30 minutes past 12 P. M., in Book 6 of Deeds, p. 88. Records of Eureka county, Nevada. R. L. Chase, recorder.

1104 EXHIBIT No. 8.

Utah No. 2.

Notice.—I have this day located this claim, to be known as the Utah No. 2, commencing at a stake and monument 47 feet due north from the northeast corner of the Bell shaft, and running 528 feet westerly, and in an easterly direction 865 feet; 100 feet wide northerly and southerly; bounded on the south by the Lupita and Margaret claim, and on the north by the Utah No. 1, and intend to work the same according to the laws of Eureka Mining District, and under the mining law of the act of Congress approved May 10th, 1876.

Ruby Hill, September 9, 1876. JOSEPH POTTS.

Filed for record and recorded September 13th, 1876.
M. G. CAVANAUGH,
Mining Recorder.

EXHIBIT No. 9.

Utah.

I have this day located the Utah claim, consisting of eight hundred and seventy-four feet (874 feet) in length by one hundred and ninety-eight (198) feet in width, situated on north side of Ruby Hill, running from the point where the ore was discovered immediately under this monument and notice, eight hundred and thirty-five (835) feet easterly and thirty-nine (39) feet westerly. The boundaries of this claim are plainly marked by stakes and stone monuments, and are more particularly described as follows:

Commencing at a post and stone monument, from whence the Lawton shaft of the E. C. M. Co. bears south 55 degrees, east eleven hundred and seventy-seven feet, and running thence north 33 degrees, east one hundred and ninety-eight feet, thence south 62½ degrees, east 874 feet, thence south 33 degrees, west 198 feet, thence north 62½ degrees, west 874 feet, to place of beginning. I claim

all the privileges allowed by the mining laws of this district, and the act of Congress approved May 10, 1872.

THOMAS WREN.

Ruby Hill, Eureka District, January 7th, 1877.

Recorded January 16th, 1877.

M. G. CAVANAUGH,
Mining Recorder.
Per G. J. SCANLAND, *Deputy.*

1105 EXHIBIT VI.

This indenture, made the twenty-third day of February, in the year of our Lord one thousand eight hundred and seventy-seven, between Thomas Wren, of the town and county of Eureka, State of Nevada, party of the first part, and the Richmond Mining Company of Nevada, a corporation duly organized and now existing under the laws of Nevada, the party of the second part, witnesseth: That the said party of the first part, for and in consideration of the sum of five hundred (500) dollars, gold coin of the United States of America, to ———————— in hand paid by the said party of the second part, the receipt whereof is hereby acknowledged, has granted, bargained, sold, remised, released, and forever quit-claimed, and by these presents does grant, bargain, sell, remise, release and forever quit-claim unto the said party of the second part, and to its successors and assigns, all that certain mining claim, ledge, lode, or deposit situate, lying, and being in the Eureka Mining District, Eureka county, State of Nevada, located, owned, and held in the name of the "Utah" claim, consisting of eight hundred and seventy-four (874) feet in length by one hundred and ninety-eight (198) feet in width, situated on the north side of Ruby Hill, running from the point where the ore was discovered immediately under the monument and notice, eight hundred and thirty-five (835) feet easterly and thirty-nine (39) feet westerly. The boundaries of this claim are plainly marked by stakes and stone monuments, and are more particularly described as follows: Commencing at a post and stone monument from whence the Lawton shaft of the E. C. M. Co. bears south 55° east eleven hundred and seventy-seven feet, and running thence north 33° east one hundred and ninety-eight feet, thence south 62° east 874 feet, thence south 33° west 198 feet, thence north 62½° west 874 feet, to place of beginning; together with all the dips, spurs, and angles, and also all the metals, ores, gold and silver-bearing quartz, rock, and earth therein; and all the rights, privileges, and franchises thereto incident, appendant, and appurtenant, or therewith usually had and enjoyed; and, also all and singular the tenements, hereditaments, and appurtenances thereto belonging, or in anywise appertaining, and the rents, issues, and profits thereof; and also all the estate,

right, title, interest, property, possession, claim, and demand whatsoever, as well in law as in equity, of the said party of the first part, of, in, or to the said premises, and every part and parcel thereof, with the appurtenances; to have and to hold all and singular the said premises, together with the appurtenances and privileges thereto incident unto the said party of the second part, its successors and assigns, forever.

In witness whereof, the said party of the first part has hereunto set his hand and seal, the day and year first above written.

[SEAL.] THOMAS WREN.

STATE OF NEVADA, } ss.
COUNTY OF EUREKA. }

On this 23d day of February, A. D. 1877, before me, F. H. Harmon, county clerk in and for said county, residing therein, and duly qualified, personally appeared Thomas Wren, whose name is subscribed to the annexed instrument as a party thereto, and who is personally known to me to be the individual described in, and who executed the annexed instrument, and who duly acknowledged to me that he executed the same freely and voluntarily, and for the uses and purposes therein mentioned.

In witness whereof, I have hereunto set my hand and affixed the seal of the district court of the sixth judicial district, the day and year in this certificate, first above written.

[OFFICIAL SEAL.] F. H. HARMON,
County Clerk and ex-officio Clerk of the District Court, 6th Judicial District.

1106 This indenture, made the 28th day of October, in the year of our Lord one thousand eight hundred and seventy-six, between Thomas Wren, of the town of Eureka, county of Eureka and State of Nevada, the party of the first part, and the Richmond Mining Company of Nevada, a corporation organized and existing under the laws of the State of Nevada, the party of the second part, witnesseth, that the said party of the first part, for and in consideration of the sum of one hundred dollars, gold coin of the United States of America, to him in hand paid by the said party of the second part, the receipt whereof is hereby acknowledged, has granted, bargained, sold, remised, released, and forever quit-claimed, and by these presents does grant, bargain, sell, remise, release, and forever quit-claim, unto the said party of the second part, and to his heirs and assigns, that certain quartz lode and mining claim situate on Ruby Hill in the Eureka Mining District,
1107 county of Eureka and State of Nevada, known and called the Atlantic lode or claim, containing six hundred feet, together with all the dips, spurs, and angles, and also all the metals, ores, gold and silver-bearing quartz, rock, and earth therein; and all the rights, privileges, and franchises thereto incident, appendant,

and appurtenant, or therewith usually had and enjoyed; and also all and singular the tenements, hereditaments, and appurtenances thereto belonging or in anywise appertaining, and the rents, issues, and profits thereof; and also all the estate, right, title, interest, property, possession, claim, and demand whatsoever, as well in law as in equity, of the said party of the first part of, in, or to the said premises, and every part and parcel thereof, with the appurtenances.

To have and to hold all and singular the said premises, together with the appurtenances and privileges thereto incident, unto
1108 the said party of the second part, its heirs and assigns, forever.

In witness whereof, the said party of the first part has hereunto set his hand and seal the day and year first above written.

THOMAS WREN. [SEAL.]

Signed, sealed, and delivered in the presence of Crittenden Thornton.

STATE OF NEVADA, } ss.
COUNTY OF EUREKA. }

On this twenty-eighth day of October, A. D. one thousand eight hundred and seventy-six, personally appeared before me, T. Laspeyre, a notary public in and for the said county of Eureka, Thos. Wren, whose name is subscribed to the annexed instrument as a party thereto, personally known to me to be the same person described in and who executed the said annexed instrument as
1109 a party thereto, and the said Thos. Wren duly acknowledged to me that he executed the same freely and voluntarily, and for the uses and purposes therein mentioned.

In witness whereof, I have hereunto set my hand and affixed my official seal, the day and year in this certificate first above written.

[SEAL.] T. LASPEYRE,
Notary Public.

Recorded at the request of Crit. Thornton, October 28th, A. D. 1876, at 15 min. past 11 A. M.

R. L. CHASE, *Recorder.*

STATE OF NEVADA, } ss.
COUNTY OF EUREKA. }

I, R. L. Chase, recorder and ex-officio auditor in and for Eureka county, Nevada, do hereby certify that the foregoing constitutes a full, true, and correct copy of the instrument as
1110 recorded in Liber 6, pages 42 and 43 of the Records of Deeds of Eureka county, Nevada.

In witness whereof, I have hereunto set my hand and affixed my official seal in office, this 25th day of July, 1878.

[SEAL.] R. L. CHASE, *Recorder*,
By C. F. HORN, *Deputy.*

1111 *Laws of Eureka Mining District.*

Sec. 1. This district shall be known as the Eureka Mining District, and shall be bounded as follows, viz:

Beginning at the place where Eureka creek or canyon crosses Simpson's old road, as laid out by him in the year 1859, thence following said road westerly to a spring in the middle gate, thence southerly along the summit of the mountains to the first valley, thence easterly along the base of the mountains to the Simpson's old road, thence northerly and along Simpson's old road to the place of beginning.

Sec. 2. There shall be a recorder elected at this meeting, who shall hold his office until the first Monday of September, A. D. 1865; he may appoint a deputy or deputies, for whose official acts he shall be responsible. The recorder or one of his deputies
1112 shall go upon the ground at the request of the locator and see that the locator measures and stakes off his claim or claims when visible. The recorder or his deputy shall call all meetings when requested by ten claim holders of the district, and preside at the same. The recorder shall keep in a suitable book or books a faithful and true record of all claims brought to him for that purpose, if such claims do not conflict with other claims; he shall record all claims in the order of their presentation, for which service he shall receive seventy-five cents for each claim recorded; he shall record all certificates of work done on claims when he is satisfied that the necessary work has been been; he shall give certificates of location or abstracts of title, for which service he shall be entitled to receive fifty cents; also to keep his books for the inspection of those interested in the mines of the district; he shall deliver his books to his lawful successor. All examinations
1113 of his books and papers to be made in his presence or that of a deputy.

Sec. 3. Claims of mining ground shall be made by posting a written notice on the claimant's ledge, defining it boundaries, if visible. A notice of mining ground by companies or individuals on file in the recorder's office shall be equivalent to the record of the same. Each claim shall consist of two hundred feet on the ledge, but claimants may consolidate their claims by locating in a common name, so that in the aggregate no more ground is claimed than two hundred feet for each name. Claimants may hold one hundred feet on each side of their ledge for mining and building purposes, but shall not be entitled to any ledge within said distance by virtue hereof. Each locator shall be entitled to all dips, spurs, and angles connecting with his ledge. All claims shall be recorded within ten days from the date of location.

1114 Sec. 4. Whenever ($100) one hundred dollars worth of labor shall have been expended on any company's claim or ($25) on any individual's claim, the same shall be deemed a fee

simple in the owners or owner thereof, and their or his grantee or assigns, and shall not thereafter be subject to relocation by other parties, except by producing to the recorder a writing acknowledging the abandonment thereof.

Sec. 5. All persons holding mining ground at the present time in this district, and all persons hereafter and previous to the date herein mentioned, shall hold the same exempt from relocation until the first Monday of June, A. D. 1865. These rules and laws may be altered or amended by a two-thirds vote of those owning claims or mining ground in this district after twenty days' notice of such intention shall have been given in the "Reese River
1115 Reveille," or some other paper published in Lander county, and shall have been posted in the most public place in the district.

Sec. 6. The laws, rules, and regulations of the Reese River Mining District, so far as not inconsistent with the foregoing rules and laws, shall and the same are hereby extended to and over this district, and made the laws, rules, and regulations thereof.

Sec. 7. Elections shall be held *viva voce*, unless otherwise determined by those present at the meeting. At an election held in the aforesaid district on the nineteenth day of September, A. D. 1864, the foregoing laws and rules for the district were adopted, and the undersigned duly elected recorder.

G. J. TANNEHILL, *President.*
E. A. PHELPS, *Secretary.*

1116 EUREKA MINING DISTRICT, *June* 5, 1865.

Pursuant to notice, a meeting of the miners of this district was this day called; on motion it was ordered that after this date the recorder's fees for recording each claim or claims shall be one dollar, and also for issuing certificates of title one dollar; and it is also ordered that after this date no claims that is now on record, or that may hereafter be placed on record, shall be relocatable before the fourth day of September, 1865, if there shall be as much as one dollar's worth of labor expended on the same. All of which was unanimously adopted.

G. J. TANNEHILL,
Secretary and Recorder.

EUREKA MINING DISTRICT, *Sept. 4th*, 1865.

Pursuant to notice a meeting of the miners of Eureka
1117 district was this day called. On motion it was ordered that after this date the recorder's fees shall be one dollar, and also for issuing certificates of title one dollar. And it is also ordered that after this date no claims that is now on record shall not be relocatable before the fourth day of June, 1866, even if there shall be as much as one dollar's worth of labor expended on the same. It

was also ordered that G. J. Tannehill be re-elected recorder of this Eureka district. All of which was unanimously adopted.

President, DENIS KENELY.
Secretary, ELISHA BREWER.

1118 EXHIBIT V.

This indenture, made the sixteenth day of October, in the year of our Lord one thousand eight hundred and seventy-six, between R. Rickard, of the town of Eureka, county of Eureka and State of Nevada, the party of the first part, and the Richmond Mining Company of Nevada, a corporation organized and existing under the laws of the State of Nevada, the party of the second part, witnesseth, that the said party of the first part, for and in consideration of the sum of five dollars ($5.00), gold coin of the United States of America, to him in hand paid by the said party of the second part, the receipt whereof is acknowledged, has granted, bargained, sold, remised, released, and forever quit-claimed; and by these presents does grant, bargain, sell, remise, release, and forever quit-claim unto the said party of the second part, and to its successors forever, that certain quartz lode and mining claim situate, lying, and being in the Eureka Mining District, county of Eureka and State of Nevada, known as and called the Arctic lode and claim, the same containing six hundred (600) feet. Together with all the dips, spurs, and angles; and also all the metals, ores, gold and silver bearing quartz, rock, and earth therein; and all the rights, privileges, and franchises thereto incident, appendant, and appurtenant, or therewith usually had and enjoyed; and also all and singular the tenements, hereditaments, and appurtenances thereto belonging, or in any wise appertaining, and the rents, issues and profits thereof; and also all the estate, right, title, interest, property, possession, claim, and demand whatsoever, as well in law as in equity, of the said party of the first part, of, in, or to the said premises, and every part and parcel thereof, with the appurtenances; To have and to hold, all and singular, the said premises, together with the appurtenances and privileges thereto incident, unto the said party of the second part, its heirs and assigns forever.

In witness whereof, the said party of the first part has hereunto set his hand and seal, the day and year first above written.

[SEAL.] R. RICKARD.

STATE OF NEVADA, } *ss.*
COUNTY OF EUREKA. }

On this seventeenth day of October, A. D. one thousand eight hundred and seventy-six, personally appeared before me, T. Laspeyre, a notary public, in and for the said county of Eureka, R. Rickard, whose name is subscribed to the annexed instrument, as a party thereto, personally known to me to be the same person described in and who executed the said annexed instrument as party

thereto, and the said R. Rickard duly acknowledged to me that he executed the same freely and voluntarily, and for the uses and purposes therein mentioned.

In witness whereof, I have hereunto set my hand and affixed my official seal, the day and year in this certificate first above written.

[NOTARIAL SEAL.] T. LASPEYRE.
Notary Public.

(Endorsed as follows:) Deed.—R. Rickard to Richmond Mining Company. Dated October 16, 1876. Recorded at the request of T. Laspeyre, October 17, A. D. 1876, at 15 minutes past 4 P. M., in Book 6 of Deeds, page 13. Records of Eureka county, Nevada. R. L. Chase, recorder.

1119 "EXHIBIT Y."

THE EUREKA CONSOLIDATED MINING COMPANY (Corporation) TO THE RICHMOND MINING COMPANY OF NEVADA (Corporation).

This indenture, made the sixteenth day of June, in the year of our Lord one thousand eight hundred and seventy-three, between the Eureka Consolidated Mining Company, a corporation organized under the laws of the State of California, the party of the first part, and the Richmond Mining Co. of Nevada, a corporation organized under the laws of the State of Nevada, the party of the second part, witnesseth, that the said party of the first part for and in consideration of the sum of five dollars, gold coin of the United States of America, to it in hand paid by the said party of the second part, the receipt whereof is hereby acknowledged, hath granted, bargained, sold, remised, released, and forever quit-claimed, and by these presents doth grant, bargain, sell, remise, release, and forever quit-claim unto the said party of the second part, and to its successors and assigns, all the mining ground situate and being in the Eureka Mining District, Eureka County, State of Nevada, and lying on the northwesterly side of the following line, to wit:

Commencing at the northeasterly corner of the Margaret mining ground or claim, which corner is marked "X" in the map or plan annexed to a certain agreement bearing even date with this indenture, made and entered into by and between the said Eureka Consolidated Mining Company of the first part, and the said Richmond Mining Company of Nevada, of the second part; running thence in a southwesterly direction along the edge of the said "Margaret" ground, the "At Last" ground, and the Champion ground, to a point marked "W" on the said map; thence southerly along the edge of the said Champion ground to the northeasterly corner of the Nugget ground; thence in a southwesterly direction along the

edge of the Nugget ground, to the northwesterly corner of the said Nugget ground at the point marked "R" on said map, including the mining claim known as the "Lookout," more particularly described in the patent, No. 392, from the United States to the said party of the first part (and which patent is herewith transferred to the party of the second part), as follows, to wit:

Beginning at a point marked No. 1, "U. S. Survey, No. 43," from which a prominent rocky point, No. 2, the summit of Silver Hill, bears south sixty-nine degrees 13 minutes east, at a distance of 7,000 three hundred and twenty feet, and the flag-staff in the town of Eureka bears north sixty-three degrees one (1) minute east, at the distance of ten thousand one hundred and forty (10,140) feet; thence from the said post south 38 degrees west, 200 feet to a post m'kd "No. 2, U. S. Survey, No. 43," the same being post No. 4 of survey No. 38, made for the claim of the Eureka Consolidated Mining Company upon the Champion lode, from which the highest point on Ruby Hill, No. 1, bears north fifty-one degrees 30 minutes east, at the distance of 88 feet; thence north thirty-four (34) degrees thirty (30) minutes west, four hundred (400) feet to post m'kd "No. 3, U. S. Survey, No. 43;" thence N. 38 degrees east, 200 feet to the post m'kd "No. 4, U. S. Survey, 43," from which the main shaft upon the "Lookout" lode bears south 29 degrees 15 minutes east, at the distance of 200 feet; thence from said post No. 4 south, 34 degrees 30 minutes east, four hundred feet to the place of beginning, containing 1 acre and seventy-five one-hundredths (75-100) of an acre of land, more or less.

Together with all the dips, spurs, and angles, and also all the metals, ores, gold and silver bearing quartz, rock, and earth therein; and all the rights, privileges, and franchises thereto incident, appendant, and appurtenant or therewith usually had and enjoyed; and also all and singular the tenements, hereditaments, and appurtenances thereto belonging or in anywise appertaining, and the rents, issues, and profits thereof; and also all the estate, right, title, interest, property, possession, claim, and demand whatsoever, as well in law as in equity of the said party of the first part, of, in, or to the said premises, and every part and parcel thereof, with the appurtenances.

To have and to hold all and singular the said premises, together with the appurtenances and privileges thereto incident and appendant unto the said party of the second part, its successors and assigns, forever.

In witness whereof, the said party of the first part has hereunto set its hand and seal the day and year first above written.

EUREKA CONSOLIDATED MINING CO.,

{SEAL OF EUREKA CON. MINING CO.} By its President, G. T. LAWTON. [SEAL.]

W. W. TRAYLOR, *Secretary*. [SEAL.]

Signed, sealed, and delivered in presence of F. J. Thibault.

STATE OF CALIFORNIA,
CITY AND COUNTY OF SAN FRANCISCO. } *ss.*

I, F. J. Thibault, a commissioner for the State of Nevada, duly commissioned and qualified under and by virtue of the laws thereof, residing in the city and county of San Francisco and State of California, do certify that on the seventeenth day of June, A. D. one thousand eight hundred and seventy-three, before me personally appeared G. T. Lawton, known to me to be the president, and W. W. Traylor, known to me to be the secretary of the Eureka Consolidated Mining Company, a corporation duly organized under the laws of the State of California, personally known to me to be the individuals described in and who executed and whose names are subscribed to the foregoing instrument, the Eureka Consolidated Mining Company being named in the said instrument, and known to me to be the corporation described therein as a party thereto; and they, the said G. T. Lawton and W. W. Traylor, duly acknowledged to me that they executed the same as such president and secretary, and as for the act and deed of the said Eureka Consolidated Mining Company, and that the said corporation executed the same freely and voluntarily for the uses and purposes therein mentioned, and that the seal which is thereto affixed is the corporate seal of said corporation, and was thereto affixed by authority thereof.

In witness whereof, I have hereunto set my hand and affixed my official seal as such commissioner, at my office in the city and county of San Francisco and State of California, this seventeenth day of June, A. D. one thousand eight hundred and seventy-three.

[SEAL.] F. J. THIBAULT,
Commissioner for Nevada in California.

Filed for record, and recorded at the request of M. D. Howell, Aug. 19th, A. D. 1873, at 9 o'clock A. M.

A. S. CAMPBELL, *Recorder.*

Book 2, pages 146, 147, 148 of Deeds, Eureka County Records.

1120 "EXHIBIT J."

General Land Office No. 2,204. Mineral Certificate No. 288.

The United States of America. To all to whom these presents shall come, greeting:

Whereas, in pursuance of the provisions of the revised statutes of the United States, chapter six, title thirty-two, there have been deposited in the General Land Office of the United States the plat and field-notes of survey of the claim of the Eureka Consolidated Mining Company upon the Lupita mine and mill-site, accompanied by the certificate of the register of the land office at Eureka, in the

State of Nevada, whereby it appears that in pursuance of said revised statutes of the United States the Eureka Consolidated Mining Company did, on the fourteenth day of February, A. D. 1877, enter and pay for said mining claim or premises, being Mineral En-
1121 try No. 288, in the series of said office, designated by the surveyor-general as lots Nos. 49 A and 49 B, embracing a portion of the unsurveyed public domain in the Eureka Mining District, in the county of Eureka and State of Nevada, in the district of lands subject to sale at Eureka, containing seven (7) acres and eighty-hundredths ($_{100}^{80}$) of an acre of land, more or less, and according to the returns on file in the General Land Office, bounded, described, and platted as follows, with magnetic variation at sixteen (16) degrees thirty (30) minutes east, to wit: Beginning for the description of that portion of the premises hereby conveyed, designated as lot No. 49 A, at a post marked "No. 1, U. S. Survey, No. 49, Lot A," from which the highest point of Ruby Hill, No. 1, bears south thirty-four (34) degrees fifteen (15) minutes west, at the distance of three hundred and fifteen (315) feet, and the flag-staff in the town of Eureka bears north sixty-three (63) degrees
1122 thirty (30) minutes east, at the distance of nine thousand nine hundred and sixty (9,960) feet; thence from said post No. 1 south fifty-two (52) degrees east, four hundred and fifty-one and two-tenths (451_{10}^{2}) feet to a post marked "No. 2, U. S. Survey, No. 49, Lot A," from which Lupita shaft upon the claim bears south fifty-seven (57) degrees fifteen (15) minutes east, at the distance of two hundred and ten (210) feet; thence from said post No. 2 north sixty-five (65) degrees fifteen (15) minutes east fifty (50) feet to a pine stump twelve (12) inches in diameter marked "No. 3, U. S. Survey, No. 49, Lot A;" thence so uthsixty-seven (67) degrees east, three hundred and forty-one feet to a post marked "No. 4, U. S. Survey, No. 49 A," the same being the northerly corner of the Eliptic claim; thence south forty-six (46) degrees fifteen (15) minutes west along the northwesterly boundary of said Eliptic claim one hundred and eighty-four (184) feet to post marked "No.
1123 5, U. S. Survey, No. 49, Lot A," situate on the northeasterly boundary of survey No. 40, patented to the Eureka Consolidated Mining Company with their claim upon the Sentinel lode; thence north fifty-two (52) degrees west, three hundred and thirty-six and one-half ($336\frac{1}{2}$) feet to a post marked "No. 6, U. S. Survey, No. 49, Lot A," the same being post No. 4 of said survey No. 40; thence south forty-nine (49) degrees thirty (30) minutes west one hundred and fifty-three (153) feet to post marked "No. 7, U. S. Survey, No. 49, Lot A," the same being post No. 2 of survey No. 47, patented to the Eureka Consolidated Mining Company with their claim upon the At Last lode; thence north fifty-two (52) degrees west, four hundred and ten and two-tenths (410_{10}^{2}) feet to a post marked "No. 8, U. S. Survey, No. 49, Lot A," the same being post No. 1 of said survey No. 47, and post No. 1 of survey No. 43,

patented to the Eureka Consolidated Mining Company with
1124 their claim upon the Lookout lode; thence north thirty-eight (38) degrees east two hundred (200) feet to the place of beginning, containing three (3) acres of land, more or less, and embracing eight hundred and five and twenty-hundredths ($805\frac{20}{100}$) linear feet of said Lupita mine.

Beginning for the description of that portion of the premises hereby conveyed, designated as lot No. 49 B, at a post marked "No. 1, U. S. Survey, No. 49, Lot B," from which post No. 1 of survey No. 49 A, hereinbefore described, bears south fifty-one (51) degrees seventeen (17) minutes west, at the distance of ten thousand eight hundred and thirty-three (10,833) feet. Post No. 1 of survey No. 48 B, patented to the Eureka Consolidated Mining Company with their mill-site, bears south twelve (12) degrees thirty (30) minutes east, at the distance of five hundred and fifty (550) feet, the flag-staff in the town of Eureka bears south eleven (11) degrees ten (10) minutes east, at the distance of twenty-three
1125 hundred and seventy-seven (2377) feet, and the southeasterly corner of the Eureka Consolidated Mining Company's stone office bears south eight (8) degrees forty-nine (49) minutes west, at the distance of five hundred and ninety-one (591) feet; thence from said post No. 1 north eighteen (18) degrees west, six hundred and ten (610) feet to a post marked "No. 2, U. S. Survey, No. 49, Lot B;" thence south seventy-seven (77) degrees thirty (30) minutes west, three hundred (300) feet to a post marked "No. 3, U. S. Survey, No. 49, Lot B;" thence south eighteen (18) degrees east, six hundred and ten (610) feet to a post marked "No. 4, U. S. Survey, No. 49, Lot B;" thence south seventy-seven (77) degrees thirty (30) minutes west, seventy-seven (77) feet to a post marked "No. 5, U. S. Survey, No. 49, Lot B;" thence south fifteen (15) degrees thirty (30) minutes east, two hundred and forty-three feet to a post marked "No. 6, U. S. Survey, No. 49, Lot B," the
1126 same being post No. 12 of said survey No. 48 B;" thence north seventy-seven (77) degrees thirty (30) minutes east, one hundred and eleven feet to a post marked "No. 7, U. S. Survey, No. 49, Lot B;" thence north fifteen (15) degrees thirty (30) minutes west, two hundred and forty-three (243) feet to a post marked "No. 8, U. S. Survey, No. 49, Lot B;" thence north seventy-seven (77) degrees thirty (30) minutes east, two hundred and sixty-six feet to the place of beginning, containing four (4) acres and eighty-hundredths (80-100) of an acre of land, more or less, which, together with the area embraced by said lot No. 49 A, hereinbefore described, aggregates seven (7) acres and eighty-hundredths (80-100) of an acre of land, more or less, as represented by yellow shading in the following plat:

[Here follows map, marked page 1127.]

1128 Now know ye, that the United States of America, in consideration of the premises, and in conformity with the said

revised statutes of the United States, have given and granted, and and by these presents do give and grant unto the said Eureka Consolidated Mining Company, and to their successors and assigns, the said mining premises hereinbefore described as lots Nos. 49 A and 49 B, embracing a portion of the unsurveyed public domain, with the exclusive right of possession and enjoyment of all the land included within the exterior lines of said survey not herein expressly excepted from these presents, and of eight hundred and five and twenty-hundredths ($805\frac{20}{100}$) linear feet of the said Lupita mine, vein, lode, ledge, or deposit for the length hereinbefore described throughout its entire depth, although it may enter the land
1129 adjoining, and also all other veins, lodes, ledges, or deposits, throughout their entire depth, the tops or apexes of which lie inside the exterior lines of said survey at the surface extended downward vertically, although such veins, lodes, ledges, or deposits in their downward course may so far depart from a perpendicular as to extend outside the vertical side lines of said survey: *Provided*, that the right of possession hereby granted to such outside parts of said veins, lodes, ledges, or deposits shall be confined to such portions thereof as lie between vertical planes drawn downward through the end lines of said survey at the surface, so continued in their own direction that such vertical planes will intersect such exterior parts of said veins, lodes, ledges, or deposits: *And provided further*, that nothing in this conveyance shall authorize the grantees herein, their successors or assigns, to enter upon the surface of a
1130 mining claim, owned or possessed by another: to have and to hold said mining premises, together with all the rights, privileges, immunities, and appurtenances of whatsoever nature thereunto belonging, unto the said Eureka Consolidated Mining Company, and to their successors and assigns forever, subject, nevertheless, to the following conditions and stipulations:

First. That the grant hereby made is restricted to the land hereinbefore described as lots Nos. 49 A and 49 B, with eight hundred and five and twenty-hundredths ($805\frac{20}{100}$) linear feet of the Lupita mine, vein, lode, ledge, or deposit for the length aforesaid, throughout its entire depth as aforesaid, together with all other veins, lodes, ledges, or deposits, throughout their entire depths as aforesaid, the tops or apexes of which lie inside the exterior lines of said survey.

Second. That the premises hereby conveyed, with the ex-
1131 ception of the surface, may be entered by the proprietor of any other vein, lode, ledge, or deposit, the top or apex of which lies outside the exterior limits of said survey, should the same in its downward course be found to penetrate, intersect, extend into, or underlie the premises hereby granted, for the purpose of extracting and removing the ore from such other vein, lode, ledge, or deposit.

Third. That the premises hereby conveyed shall be held subject to a*ny* vested and accrued water rights for mining, agricultural, man-

ufacturing, or other purposes, and rights to ditches and reservoirs used in connection with such water rights as may be recognized and acknowledged by the local customs and decisions of courts.

Fourth. That in the absence of necessary legislation by Congress, the legislature of Nevada may provide rules for working the mining claim or premises hereby granted, involving easements,
1132 drainage, and other necessary means to its complete development.

In testimony whereof, I, Rutherford B. Hayes, President of the United States of America, have caused these letters to be made patent, and the seal of the General Land Office to be hereunto affixed.

Given under my hand at the city of Washington, the thirtieth day of March, in the year of our Lord one thousand eight hundred and seventy-seven, and of the independence of the United States the one hundred and first.

[SEAL.]

By the President:
R. B. HAYES,
By D. D. CONE,
Secretary.
S. W. CLARK,
Recorder of the General Land Office.

Recorded Vol. 26, pages 212 to 219, inclusive.
Examined.

1133 "EXHIBIT II."

General Land Office No. 886. Mineral Certificate No. 164.

The United States of America. To all to whom these presents shall come, greeting:

Whereas, in pursuance of the act of Congress, approved July twenty-six, eighteen hundred and sixty-six, entitled "An act granting the right of way to ditch and canal owners over the public lands, and for other purposes;" the act amendatory thereof, approved July ninth, eighteen hundred and seventy; and the act approved May 10th, eighteen hundred and seventy-two, entitled "An act to promote the development of the mining resources of the United States," there have been deposited in the General Land Office of the United States the plat and field-notes of survey of the claim of the Richmond Mining Company of Nevada upon
1134 the Tip-Top lode, accompanied by the certificate of the register of the land office at Eureka, in the State of Nevada, whereby it appears that in pursuance of said act of Congress the Richmond Mining Company of Nevada did, on the 30th day of August, A. D. 1873, enter and pay for said mining claim or premises, being Mineral Entry No. 164, in the series of said office, designated by the surveyor-general as lot No. 65, embracing a portion of the unsur-

veyed public domain, in the Eureka Mining District in the county of Eureka and State of Nevada, in the district of lands subject to sale at Eureka, embracing three (3) acres and thirty-nine hundredths ($\frac{39}{100}$) of an acre of land, more or less, and, according to the returns on file in the General Land Office, bounded, described, and platted as follows, with magnetic variation at sixteen (16) degrees thirty (30) minutes east, to wit:

1135 Beginning at a post marked "Tip-Top S. E. cor." and "Richmond N. E. cor.," the same being the northeasterly corner of survey No. 64, made for the claim of the Richmond Mining Company of Nevada upon the Richmond lode, from which the Tip-Top shaft bears south seventy-one (71) degrees west at the distance of one hundred and forty (140) feet, and the flag-staff in Main street in town of Eureka bears north sixth-five (65) degrees fifteen (15) minutes east at the distance of ten thousand three hundred and eighty-five (10,385) feet; thence from said post north thirty-four (34) degrees (15) minutes west six hundred (600) feet to post marked "Tip-Top N. E. cor.;" thence south thirty-eight (38) degrees west three hundred feet to post marked "Tip-Top N. W. cor." thirty-four (34) degrees fifteen (15) minutes east six hundred (600) feet to an iron pin and stone monument at northwesterly corner of said survey No. 64; thence north thirth-eight (38) de-

1136 grees east three hundred (300) feet to the place of beginning, containing three (3) acres and ninety-three hundredths ($\frac{93}{100}$) of an acre of land, more or less, and embracing six hundred (600) linear feet of said Tip-Top lode, as represented by yellow shading in the following plat:

1137 Plat of the claim of the Richmond Mining Company of Nevada upon the Tip-Top lode, Eureka Mining District, Eureka county, Nevada, containing $3\frac{39}{100}$ acres. Scale of 200 feet to an inch. Mag. var. 16° 30′ east.

[Here follows map, marked page 1137.]

1138 Now know ye, that the United States of America, in consideration of the premises, and in conformity with said acts of Congress, have given and granted, and by these presents do give and grant, unto the said Richmond Mining Company of Nevada, and to their sucessors and assigns, the said mining premises hereinbefore described as lot No. 65, embracing a portion of the unsurveyed public domain, with the exclusive right of possession and enjoyment of all the land included within the exterior lines of said survey not herein expressly excepted from these presents, and of six hundred (600) linear feet of the said Tip-Top vein, lode, ledge, or deposit for the length hereinbefore described, throughout its entire depth, although it may enter the land adjoining, and also all other veins, lodes, ledges, or deposits throughout their entire

1139 depth, the tops or pexes of which lie inside the exterior boundary lines of said survey at the surface, extended downward

vertically, although such veins, lodes, ledges, or deposits in their downward course may so far depart from a perpendicular as to extend outside the vertical side lines of said survey: *Provided*, that the right of possession hereby granted to such outside parts of said veins, lodes, ledges, or deposits shall be confined to such portions thereof as lie between vertical planes drawn downward through the end lines of said survey at the surface, so continued in their own directions that such vertical planes will intersect such exterior parts of said veins, lodes, ledges, or deposits: *And provided further*, that nothing in this conveyance shall authorize the grantees herein, their successors or assigns, to enter upon the surface of a mining claim owned or possessed by another: to have and to hold said mining premises, together with all the rights, privileges, im-
1140 munities, and appurtenances of whatsoever nature thereunto belonging, unto the said Richmond Mining Company of Nevada, and to their successors and assigns, forever, subject, nevertheless, to the following conditions and stipulations:

First. That the grant hereby made is restricted to the land hereinbefore described as lot No. 65, with six hundred (600) linear feet of Tip-Top vein, lode, ledge, or deposit for the length aforesaid throughout its entire depth as aforesaid, together with all other veins, lodes, ledges, or deposits throughout their entire depth as aforesaid, the tops or apexes of which lie inside of the exterior lines of said survey, but subject to the right of other parties to follow any vein or lode, with its dips, angles, and variations, legally held under a location made prior to May 10, 1872.

Second. That the premises hereby conveyed, with the exception of the surface, may be entered by the proprietor of any other vein, lode, ledge, or deposit, the top or apex of which lies outside
1141 of the exterior limits of said survey, should the same, in its downward course, be found to penetrate, intersect, extend into, or underlie the premises hereby granted, for the purpose of extracting and removing the ore from such other vein, lode, ledge, or deposit.

Third. That the premises hereby conveyed shall be held subject to any vested and accrued water rights, for mining, agricultural, manufacturing, or other purposes, and rights to ditches and reservoirs used in connection with such water rights as may be recognized and acknowledged by the local laws, customs, and decisions of courts.

Fourth. That in the absence of necessary legislation by Congress, the legislature of Nevada may provide rules for working the mining claims or premises hereby granted, involving easements, drainage, and other necessary means, to its complete development.

1142 In testimony whereof, I, Ulysses S. Grant, President of the United States of America, have caused these letters to

be made patent, and the seal of the General Land Office to be hereunto affixed.

Given under my hand at the city of Washington, the thirtieth day of April, in the year of our Lord one thousand eight hundred and seventy-four, and of the independence of the United States the ninety-eighth.

[SEAL.]

By the President:
U. S. GRANT,
By L. D. WILLIAMSON,
Secretary.
J. K. LIPPINETT,
Recorder of the General Land Office.

Recorded Vol. 10, pages 223 to 228. Examined.

[Endorsed:] United States to Richmond Mining Co. Mineral Certificate No. 164, Tip-Top Lode. Dated April 30, 1874.

Recorded at request of J. J. Corrigan, September 12th, 1874, at 30 minutes past 11 o'clock A. M., in Liber Three of Deeds, pages 21 to 25, Eureka county, Nevada, Records.

T. J. TENNANT, *Recorder.*

1143 "EXHIBIT III."

General Land Office No. 392. Mineral Certificate No. 111.

United States of America. To all to whom these presents shall come, greeting:

Whereas, in pursuance of the act of Congress approved July twenty-sixth, eighteen hundred and sixty-six, entitled "An act granting the right of way to ditch and canal owners over the public lands, and for other purposes;" the act amendatory thereof, approved July ninth, eighteen hundred and seventy; and the act approved May tenth, eighteen hundred and seventy-two, entitled "An act to promote the development of the mining resources of the United States," there have been deposited in the General Land Office of the United States the plat and field-notes of the sur-
1144 vey of the claim of the Eureka Consolidated Mining Company upon the Lookout lode, bearing silver, accompanied by the certificate of the register of the land office at Austin, in the State of Nevada, whereby it appears that in pursuance of said acts of Congress, the Eureka Consolidated Mining Company did, on the twelfth day of September, A. D. 1871, enter and pay for said mining claim or premises, being Mineral Entry No. 111, in the series of said office, designated by the surveyor-general as lot number forty-three (43), forming a portion of the unsurveyed public domain in the Eureka Mining District, in the county of Lander and State of Nevada, in the district of lands subject to sale at Austin, embracing one (1) acre and seventy-five hundredths ($\frac{75}{100}$) of an acre of land,

more or less, and according to the returns on file in the Gen-
1145 eral Land Office, bounded, described, and platted as follows, with magnetic variation at sixteen (16) degrees thirty (30) minutes east, to wit:

Beginning at a post marked "No. 1, U. S. Survey, No. 43," from which a prominent rocky point, No. 2, the summit of Silver Hill bears south sixty-nine (69) degrees thirteen (13) minutes east, at the distance of seven thousand three hundred and twenty (7,320) feet and the flag-staff in the town of Eureka bears north sixty-three (63) degrees one (1) minute east, at the distance of ten thousand one hundred and forty (10,140) feet; thence from said post south thirty-eight (38) degrees west two hundred (200) feet to post "No. 2, U. S. Survey, No. 43;" the same being post No. 4, of survey No. 38, made for the claim of the Eureka Consolidated Mining Company upon the Champion lode, from which the higest point of Ruby Hill, No. 1, bears north fifty-one (51) degrees thirty (30)
1146 minutes east at the distance of eighty-eight (88) feet; thence north thirty-four (34) degrees thirty (30) minutes, west four hundred (400) feet to post marked "No. 3, U. S. Survey, No. 43;" thence north thirty-eight (38) degrees, east two hundred (200) feet to post marked "No. 4, U. S. Survey, No. 43," from which the main shaft upon the Lookout lode bears south twenty-nine (29) degrees fifteen (15) minutes east, at the distance of two hundred (200) feet, thence from said post No. 4, south thirty-four (34) degrees thirty (30) minutes east four hundred (400) feet to the place of beginning. Containing one (1) acre and seventy-five hundredths ($\frac{75}{100}$) of an acre of land, more or less, as represented by yellow shading
1147 in the following plat: Survey No. 43. Plat of the Eureka Consolidated Mining Company's claim upon the Lookout lode, Eureka Mining District, Lander county, Nevada, containing $1\frac{75}{100}$ acres. Scale of 150 feet to an inch. Variation 16° 30′ E.

[Here follows map, marked page 1147.]

1148 Now know ye, that the United States of America, in consideration of the premises, and in conformitywith the said acts of Congress, have given and granted, and by these presents do give and grant unto the said Eureka Consolidated Mining Company, and to their successors and assigns, the said mining premises hereinbefore described as lot No. forty-three (43), forming a portion of the unsurveyed public domain, with the exclusive right of possession and enjoyment of all the land included within the exterior lines of said survey not herein expressly excepted from these presents, and of four hundred (400) linear feet of said Lookout vein, lode, ledge, or deposit as hereinbefore described, throughout its entire depth, although it may enter the land adjoining; and of all veins, lodes, ledges, or deposits throughout their entire depth, the tops or apexes of
1149 which lie inside the exterior boundary lines of said survey

at the surface, extended downward vertically, although such veins, lodes, ledges, or deposits in their downward course may so far depart from a perpendicular as to extend outside the vertical side lines of said survey: *Provided*, that the right of possession hereby granted to such outside parts of said veins, lodes, ledges, or deposits shall be confined to such portions thereof as lie between vertical planes drawn downward through the end lines of said survey at the surface, so continued in their own direction that such vertical planes will intersect such exterior parts of said veins, lodes, ledges, or deposits:

And provided further, that nothing in this conveyance shall authorize the grantees herein, their successors or assigns, to enter upon the surface of a mining claim owned or possessed by another: To have and to hold said mining premises, together with all rights, privileges, immunities, and appurtenances of whatsoever nature thereunto belonging, unto the said Eureka Consolidated Mining Company, and to their successors and assigns forever, subject, nevertheless, to the following conditions and stipulations:

First. That the grant hereby made is restricted to the land hereinbefore described as lot number forty-three (43), with four hundred (400) linear feet of the Lookout vein, lode, ledge, or deposit throughout its entire depth as aforesaid, together with all other veins, lodes, ledges, or deposits throughout their entire depth as aforesaid, the tops or apexes of which lie inside of the exterior lines of said survey, and to which no valid adverse claim existed on the tenth day of May, eighteen hundred and seventy-two.

Second. That the premises hereby conveyed, with the exception of the surface, may be entered by the proprietor of any other vein, lode, ledge, or deposit, the top or apex of which lies outside of the exterior limits of said survey, should the same in its downward course be found to penetrate, intersect, extend into, or underlie the premises hereby granted, for the purpose of extracting and removing the ore from such other vein, lode, ledge, or deposit.

Third. That the premises hereby conveyed shall be held subject to any vested and accrued water rights for mining, agricultural, manufacturing, or other purposes, and rights to ditches and reservoirs used in connection with such water rights as may be recognized and acknowledged by the local laws, customs, and decisions of courts.

Fourth. That in the absence of necessary legislation by Congress, the legislature of Nevada may provide rules for working the mining claim or premises hereby granted, involving easements, drainage, and other necessary means to its complete development.

In testimony whereof, I, Ulysses S. Grant, President of the United States of America, have caused these letters to be made patent, and the seal of the General Land Office to be hereunto affixed.

Given under my hand at the city of Washington, the sixteenth day of July, in the year of our Lord one thousand eight hundred

and seventy-two, and of the independence of the United States the ninety-seventh.

By the President:

[SEAL.]

U. S. GRANT,
By Z. B. STURGUS,
Assistant Secretary.
C. B. HOUGHTON,
Recorder of the General Land Office.

Recorded Vol. 4, pages 286 to 292. Examined.

(Endorsed:) Recorded at request of Wells, Fargo & Co., October 1st, A. D. 1872, at 30 minutes past 5 P. M., in Liber 41 of Deeds, page 497. H. J. BIDLEMAN, *Recorder.*

1153 "EXHIBIT W."

EUREKA CONSOLIDATED MINING CO.
to
RICHMOND MINING COMPANY.

This indenture, made the twenty-sixth day of April, in the year of our Lord one thousand eight hundred and seventy-one, between the Eureka Consolidated Mining Company, party of the first part, and the Richmond Mining Company, the party of the second part, witnesseth, that the said party of the first part, for and in consideration of the sum of one dollar, gold coin of the United States of America, to it in hand paid by the said party of the second part, the receipt whereof is hereby acknowledged, has remised, released, and forever quit-claimed, and by these presents does remise, release, and forever quit-claim unto the said party of the second part, and to its heirs and assigns, all that certain lot, piece, or parcel of land
1154 situate, lying, and being in the State of Nevada, county of Lander, Eureka Mining District, and bounded and particularly described as follows, to wit:

Commencing at a point whence the SW. corner of the Champion mine bears S. 52 degrees E. 202.2 ft., (two hundred and two and two 2-10 feet,) and thence running N. 52 deg. W. 147.8 ft., (one forty-seven and 8-10 feet;) thence N. 38 deg. E. 153 ft., (one hundred and fifty-three feet;) thence S. 6 deg. E. 212.8 ft., (two hundred and twelve and 8-10 feet,) to the place of beginning, containing 26-100 (twenty-six one-hundredths) acres.

The above-described triangle is ground claimed by the Richmond Mining Company as a part of their original location, and was included within the survey made for the Eureka Consolidated Mining Company. But it is expressly understood and agreed that this deed does not convey or quit-claim or release any ores,
1155 precious metals, veins, lodes, or deposits, dips, spurs, or angles not embraced within the above-mentioned boundaries; and that the party of the second part agrees and covenants for itself,

its successors and assigns, to make no claim hereafter to any ground or ore or metals therein embraced within the Nuget, Champion, Lookout, At-Last, Margaret, and other mining claims and locations now owned and possessed by the party of the first part, except as to that contained within the limits of the above-described triangular piece of ground, together with all and singular the tenements, hereditaments, and appurtenances thereunto belonging or in anywise appertaining, and the reversion and reversions, remainder and remainders, rents, issues, and profits thereof. And also all the estate,
right, title, interest, property, possession, claim, and demand
1156 whatsoever, as well in law as in equity, of the said party of the first part, of, in, or to the said premises, and every part and parcel thereof, with the *the* appurtenances.

To have and to hold all and singular the said premises, together with the appurtenances, unto the said party of the second part, its successors and assigns, forever.

In witness whereof, the said party of the first part has hereunto set its hand and seal, the day and year first above written.

EUREKA CONSOLIDATED MINING CO.,
By its President, G. T. LAWTON. [SEAL.]

Signed, sealed, and delivered in presence of E. V. Joice.

[U. S. and state rev. stps. 50c., ea. cld.]

STATE OF CALIFORNIA,
CITY AND COUNTY OF SAN FRANCISCO. } *ss.*

On this twenty-sixth day of April, 1871, before me, E. V. Joice,
a commissioner of deeds for the State of Nevada, duly
1157 commissioned and sworn, residing in the city and county aforesaid, personally appeared the within-named G. T. Lawton, president of the Eureka Consolidated Mining Company, a corporation organized under and by virtue of the laws of the State of California, whose name is subscribed to the annexed instrument as such president, personally known to me to be the individual described in and who executed said instrument as such president of said corporation, and who acknowledged to me that he executed the same freely and voluntarily, and for the uses and purposes therein mentioned, and as the act and deed of said corporation, and that the seal affixed to said instrument is its true and lawful corporate seal, and that he subscribed the said instrument, and said corporate seal was affixed by virtue of authority duly conferred by said corporation.

1158 Witness my hand and official seal, the day and year in this certificate first written.

[SEAL.] E. V. JOICE,
Commissioner of Deeds for the State of Nevada.

Recorded at request of Wm. Adams, May 4, A. D. 1871, at 8 min. past 6 P. M.

H. J. BIDDLEMAN, *Recorder.*

Liber 39, page 257, Lander County Records, Book 2, page 615 of transcribed records of Lander to Eureka county.

1159 In the Circuit Court of the United States, Ninth Judicial Circuit, District of Nevada.

THE EUREKA CON. M. Co.
v.
THE RICHMOND M. Co. OF NEVADA.

DISTRICT OF NEVADA, *ss.*

I, T. J. Edwards, clerk of the Circuit Court of the United States, Ninth Judicial Circuit, in and for the District of Nevada, do hereby certify that the foregoing 755 printed and written pages, from 1 to 755 inclusive, are a true and full copy of the enrolled papers, and of all proceedings in the cause therein entitled.

In witness whereof, I have hereunto set my hand and affixed the seal of said Circuit Court, at my office in Carson City, district of Nevada, this 5th day of December, A. D. 1878.

[SEAL.] T. J. EDWARDS, *Clerk.*.

In Supreme Court of the United States.

The Richmond Mining Company of Nevada, *Appellant*,

vs.

The Eureka Consolidated Mining Company, *Respondent*,

} No.

The Richmond Mining Company of Nevada, *Appellant*,

vs.

The Eureka Consolidated Mining Company, *Respondent*,

} No.

BRIEF FOR APPELLANT.

THOS. WREN
AND S. M. WILSON,
Counsel for Appellant.

R. O. Polkinhorn, Pr., 622 and 624 D Street, Washington, D. C.

In Supreme Court of the United States.

The Richmond Mining Company of Nevada, *Appellant*,

vs.

The Eureka Consolidated Mining Company, *Respondent*,

No.

The Richmond Mining Company of Nevada, *Appellant*,

vs.

The Eureka Consolidated Mining Company, *Respondent*,

No.

BRIEF FOR APPELLANTS.

I.

This action was commenced originally by the Respondent, the Eureka Consolidated Mining Company, against the Appellant, the Richmond Mining Company of Nevada, in a State Court of the State of Nevada, for the possession of certain mining ground situated in the Eureka Mining District, in the County of Eureka, in the State of Nevada, and described in the bill herein of the Eureka Company.

The Eureka Company is a corporation, created under the laws of California, and the Richmond Company is a corporation created under the laws of Nevada.

The complaint of the Eureka Company in the State Court, in addition to the usual allegations of a declaration in ejectment, set forth various grounds upon which was based a prayer for an order restraining the Richmond Company from working the premises in controversy pending the action.

The Richmond Company, in its answer to the complaint, not only denied the title of the Eureka Company, but made various averments upon which a like restraining order against the Eureka Company was asked. Both orders were granted in the State Court.

This union of a demand in ejectment, for the property in controversy, with a prayer for provisional equitable relief, is permitted by the system of procedure which obtains in the State Courts. Upon the application of the Eureka Company and upon the ground of its incorporation in the State of California, and the incorporation of the Richmond Company in the State of Nevada, the case was transferred to the Circuit Court of the United States.

Upon the transfer of the action, the pleadings of the Eureka Company were amended by substituting a regular complaint in ejectment on the law side of the Court, and a bill was filed for an injunction on its equity side.

The Richmond Company answered both, and also filed a cross-bill for an injunction.

Upon the trial of the action of ejectment, the evidence was taken down by reporters. The testimony thus taken was by stipulation received as depositions in the equity suits, and both cases were disposed of at the same time.

The mining ground in controversy is situated in a zone of limestone running through a hill known as Ruby Hill.

Underlying the zone of limestone is a zone or belt of quartzite, and overlying the zone of limestone is a zone or belt of shale; and overlying the shale are found zones of limestone, shale and quartzite, alternating, and extending for about a mile to the northeast.

These zones of rock were originally deposited under the bed of the ocean in horizontal strata, and subsequently by some great dynamic force were raised to their present elevation, several thousand feet above the level of the sea, and crumpled into a mountain fold, known as Prospect Mountain, of which Ruby Hill is a spur.

During this period of elevation, these zones of limestone, quartzite and shale were tilted up, and the strata stand at present at any angle of about 40 degrees to the plane of the horizon. Numerous fissures were formed in the zone of limestone, lying between the quartzite and shale, at some period in its history; probably by the forces by which it was elevated and crumbled.

After these fissures were opened, waters charged with carbonic acid entered and dissolved out the limestone, enlarging the fissures somewhat irregularly, and forming considerable caves and cavities in the limestone.

Subsequently thermal waters, holding valuable minerals, gold, silver and lead, and also other metals in solution came up through these fissures from great depths below; and the ore was deposited in these fissures, caves and cavities, from these solutions, where it is now found.

II.

On May 23d, 1870, the Champion mining claim of the Eureka Company was located on croppings of ore within this limestone zone, as a ledge or deposite location. The "Nuget," "At Last," "Buckeye," "Mammoth," "Sentinel," "Elliptic," and "Savage" claims of the Eureka Com-

pany were located upon this zone, as square or deposit locations, and afterwards as vein or lode locations. But the time at which these locations were made does not appear from the evidence.

The Lupita location of the Eureka Company was located within this zone as a lode or vein location.

On July 3d, 1872, patents were issued to the Eureka Company for the Sentinel and Mammoth claims.

On July 16th, 1872, patents were issued to the Eureka Company for the Champion and Savage veins, lodes, ledges or deposits.

On July 12th, 1876, patents were issued to the Eureka Company for the "Nuget" and "At Last" veins, lodes, ledges or deposits; and on March 30th, 1877, and after this action was commenced, a patent was issued to the Eureka Company for the Lupita vein, lode or deposit.

On September 20th, 1869, the Richmond mining claim was located on croppings of the vein or lode within this zone, both as a square or deposit location, and as a lode or vein location; and on the same day the "Tip-top" claim of the Richmond Company was located on croppings of the vein or lode within this zone of limestone, as a lode or vein location.

On May 20th, 1869, the "Lookout" mining claim of the Richmond Company was located within this zone as a square or deposit location.

On April 30th, 1874, patents were issued to the Richmond Company for the Richmond and Tip-top veins, lodes or deposits; and on July 16, 1872, a patent was issued to the Eureka Company for the Lookout vein, lode, ledge or deposit; and on June 16th, 1872, the Eureka Company conveyed the Lookout claim to the Richmond Company.

On January 7th, 1877, the Utah claim was located, and the Richmond Company was the owner thereof at the time this action was commenced.

On October 2d, 1876, the Arctic claim was located outside of this limestone zone, and immediately over a part of the ground in controversy, and the Richmond Company was the owner thereof at the time this action was commenced. The surface lines of all of said mining claims, and their relative positions to each other are correctly shown upon the map of the Richmond Company.

The mining ground in controversy does not lie within the exterior limits, at the surface, of the patented mining claims of the Eureka Company, as described in its Bill, but does lie within the exterior limits of the Arctic, Atlantic and Utah mining claims of the Richmond Company.

In 1872 the Eureka Company was the owner of the Lookout claim. The Richmond Company, during that year, in working upon the vein that has its outcrop upon the Richmond claim, followed it upon its dip from the point at which it crops out, into and under the Lookout claim; whereupon the Eureka Company commenced an action against the Richmond Company to recover possession of that portion of the vein lying within the exterior surface lines of the Lookout claim, extended vertically downward. In that action the Eureka Company contended that there were no lodes upon Ruby Hill; that the ore bodies were deposits and not lodes; that the Richmond Company acquired no right under the Richmond location to follow the Richmond ore body on its dip outside of the side lines of the claim into and under the Lookout claim. The Richmond Company, then as now, contended that the ore body that had its outcrop in the Richmond claim was a vein or lode, and that the Richmond Company had the right to follow it on its dip outside the exterior lines of the claim

at the surface, extended vertically downward, although it entered the land adjoining.

In 1873 that action was compromised. As a part of that compromise, a dividing line was established by agreement, between the claims of the companies. This line commenced at the point marked "X" on the map, and ran in a southwesterly direction to the point marked "R," and extended to the centre of the earth. In pursuance of the agreement the Richmond Company conveyed all the mining ground lying on the southeasterly side of the dividing line, together with all the dips, spurs and angles, and also all the metals, ores, gold, and silver-bearing quartz, rock and earth therein, to the Eureka Company, and the Eureka Company conveyed all of the mining ground lying to the northwesterly of the division line, together with all the dips, spurs, angles, and also all the metals, ores, gold and silver-bearing quartz, rock and earth therein, to the Richmond Company.

In relation to the facts above stated there was no conflict of testimony in this case.

In this case the Eureka Company contends:

First—That this limestone zone is a lode; that it acquired title under the patent to the Champion to all that portion of the zone lying within planes drawn vertically down through the end-lines of the surface location of the Champion, produced so as to follow the zone to any depth though it may enter the land adjoining; and that the mining ground in controversy lies within the zone and within those planes.

Second—That it acquired title under the patent to the Champion to all that portion of the ore body, that has its outcrop in the Champion that lies between planes drawn vertically down through the end-lines of the surface loca-

tion of the Champion, and produced so as to follow the ore body to any depth, although it may enter the land adjoining; and that the mining ground in dispute is a part of the Champion ore body, and lies between said planes.

Third—That the top or apex of the ore body in dispute is within the exterior limits of the At Last and Lupita claims of the Eureka Company, and that it lies between planes drawn vertically down through the extreme points of the At Last and the Lupita, and so extended as to follow the lode on its dip, and that the mining ground in dispute lies between these planes.

Fourth. That the dividing line agreed upon by the two companies in 1873, by the terms of the agreement was to extend indefinitely northeasterly from the point X; and that the Richmond Company had conveyed by its conveyance above recited all of the mining ground lying southeasterly of the dividing line, extended indefinitely to the Eureka, and that the mining ground in dispute lies to the southeasterly of the dividing line.

The Richmond, on the other hand contends:

First—That the zone of limestone is not a lode or vein in the sense in which those terms are used in the Acts of Congress, or in any other sense. That in the zone there are numerous lodes or veins in the sense in which those terms are used in the Acts of Congress. That the outcrop of the vein or lode in which the mining ground in dispute is situated is on the Richmond claim, and that said mining ground lies between planes drawn vertically down through the end lines of the Richmond claim on the dip of the lode at right angles with its ~~course~~ strike. That the Richmond claim was located upon the outcrop of this vein on September 20th, 1869, and prior to the location of the Champion

claim. That under the act of Congress of July 26th, 1866, and by virtue of the location of the Richmond lode thereunder, the Richmond Company is entitled to follow the lode on its dip to any depth, although it may enter the land adjoining.

Second—That if the limestone zone is a lode, the Richmond Company, by virtue of the location of the Richmond claim upon the zone, under the Act of July 26th, 1866, has the right to follow the zone on its dip to any depth, although it may enter the land adjoining; that the right was reserved by the Act of Congress of May 10th, 1872, and confirmed to it by the patent to the Richmond vein or lode; and that the general ~~course~~ strike of the zone is northwest and southeast, and that it dips to the northeast, and on its dip embraces the mining ground in dispute.

Third—That the Richmond Company was in the actual and exclusive possession of that portion of the mining ground in dispute described in the bill of the Eureka Company as the portion from which the Richmond Company had ousted and ejected the Eureka Company at the time when this action was commenced.

Fourth—That the patents of the Eureka Company to the At Last and Lupita, are invalid and void.

Assignment of Errors.

I.

The court erred in holding that the zone of limestone lying between the quartzite and shale, and within which the lodes, veins and deposits of ore are situated, and upon which the mining claims of the Eureka Company and the Richmond, Tip-Top and Lookout mining claims of the

Richmond Company are located, is a lode in the sense in which that term is used by miners, and in which it is used in the Acts of Congress. The term is used in the acts of Congress in the sense in which it is generally understood and defined.

The terms lode, vein or ledge are not applied to, nor is either of them a synonym of a zone of rock in which separate ore-bodies or deposits are found, with large spaces of barren rock intervening between them.

The miners of the Eureka Mining District, in which the zone is situated, by their laws and usages have always defined and located the ore-bodies found within the zone as separate lodes or deposits, and have never defined or located the zone as a lode, vein or ledge.

II.

The court erred in holding that the Richmond Company had lost the right to follow the Richmond lode on its dip to any depth, although it might enter the land adjoining, by a failure to protest the application of the Eureka Company for a patent to the Champion lode. The location of the Richmond claim secured the right under the Act of Congress of July 26th, 1866, to follow the Richmond vein or lode on its dip, though it might enter the land adjoining; and this right was reserved to the Richmond Company by the Act of Congress of May 10th, 1872, and by the patent granted to the Eureka Company for the Champion lode, and was confirmed to the Richmond Company by its patent to the Richmond vein or lode; and the filing of an adverse claim by the Richmond Company with the Register and Receiver of the Land Office was not required, and would not have been allowed by the Land Department of the Government, to secure this right. Under the Act of Congress of May 10th, 1872, no conflict arose or could

arise between the Eureka Company and the Richmond Company, upon the application of the Eureka Company for a patent to the Champion claim, in reference to this right.

III.

The court erred in holding that the patents of the Eureka Company for the At Last and Lupita claims are valid.

The law of May 10th, 1872, requires the end lines of surveys for patents to mining claims to be parallel. The end lines of the At Last and Lupita are not parallel, and are therefore invalid and void.

IV.

The court erred in holding that the Eureka Company, under its patent to the Champion Claim, was entitled to follow the Champion lode within planes drawn vertically down through the end lines of the Champion claim, and so produced as to follow the lode to any depth.

Under the law of May, 10, 1872, this right was only granted to the company under the Champion patent, and the law where no adverse rights existed, at the time of the passage of the law; and the Richmond Company, at the time of the passage of the law had a claim adverse to this right claimed by the Eureka Company under the Champion patent.

V.

The Court erred in holding that the Richmond Company was restricted by the law of May 10th, 1872, and by its patent to the Richmond claim to such portions of the Richmond vein, or lode, as lie outside of the surface lines

of said claim, extended downward vertically, lying between vertical plans drawn downward through the end lines of the Richmond patent so continued in their own direction that such planes will intersect such enterior parts of said vein or lode.

Under the law of July 26th, 1866, the Richmond Company acquired the right to follow the Richmond vein or lode on its dip to any depth although it might enter the land adjoining.

The law of May 10th, 1872, reserved this right and the right was confirmed by the patent to the claim.

VI.

The Court erred in holding that the zone of limestone is a lode, and that the Richmond Company did not have the right to follow it on its dip to any depth, although in its course downward it might enter the land adjoining. The Richmond Company, if the zone is held to be a lode, acquired the right by the location under the Act of Congress of May 10th, 1866, to follow the zone downward on its dip to any depth, although it might enter the land adjoining, and the Act of Congress of May 10th, 1872, confirmed that right, and the patent for the claim issued to it granted that right; and this secured the right of the Richmond Company to the property in dispute.

VII.

The decree is against the evidence. It appears from the evidence that the Champion claim of the Eureka Company and the Richmond claim of the Richmond Company are on separate lodes or veins; that the mining ground in dispute is on the Richmond lode on its dip, and that it is not on the Champion lode, and that no portion of it lies within the surface lines of the Champion claim, extended vertically

downward, nor within the surface lines, extended vertically downward, of any other claim of the Eureka Company. And that it is not upon any lode on its dip or otherwise, that has its top or apex within the surface lines, extended vertically downward, of the Champion or any other claim of the Eureka Company. And that the Richmond Company was in possession of the mining ground in dispute at the commencement of this action. That upon the law and these facts, the decree should have been in favor of the Richmond Company, and against the Eureka Company.

Points.

Veins or lodes are aggregations of mineral matter, containing ores in fissures of rocks.

The rock in which a lode occurs is called the country rock, or wall rock, and those sides next to the lode, the walls.

When the lode is not perpendicular, the wall over it is called the hanging wall, and the wall under it the foot wall.

The extension of a lode in a horizontal direction is the strike; the angle which a lode makes to the plane of the horizon is its dip. The outcrop of a vein is that portion of the vein appearing at the surface.

Students' Manual of Geology by Jukes, p. 292, 3d Ed.

Von Cottea's Treatise on ore deposites, (Prime Translation,) page 26, sec. 16.

Mining Statistics West of the Rocky Mountains, by Rossiter W. Raymond, p. 453, 454.

The dip of a vein is always at right angles with its strike.

(Transcript of Testimony, page 115, lines 31–32, and 33.)

Von Cotta's Treatise on ore deposits page 17 Sec. 11

Fissure veins are veins that traverse a rock independent of its texture and position, and not parallel with its stratification.

(Von Cottea's Treatise on Ore Deposits, Prime Translation, pp. 27–28.)

There is a great variety of veins or lodes besides true fissure veins. Von Cottea mentions contact veins, pipe veins, lenticular veins, rake veins, flat veins, bedded veins, and gash veins.

(Von Cottea's Treatise on Ore Deposits, Prime Translation, p. 27, §§ 16–17, and p. 28, § 17.)

When a fissure is formed, it must necessarily be through pre-existing rock. If the fissure is not perpendicular, its upper side or boundary is the hanging wall, and the lower side or boundary, the foot-wall.

If, subsequently. the fissure is filled with ore, it becomes a lode or vein, and the upper side of the fissure becomes the hanging-wall, or upper boundary of the lode, and the under side, the foot-wall, or lower boundary of the lode; and the rock through which the fissure was formed, and through which the subsequently formed lode runs, is the country rock or wall rock of the lode.

By keeping in view these simple definitions, but little difficulty will be experienced in arriving at just conclusions, if our view of the law in this case be correct.

The principal ore bodies found in this zone of limestone are fissure veins or lodes, and the limestone bounding these ore bodies forms the walls and wall-rock of the lodes.

Mr. Reed, Mr. Keyes, Mr. Hunt and Mr. Raymond, witnesses for the Eureka Company, and Messrs. King, Ashburner and Hague, witnesses for the defendant, all testified that this limestone zone and the adjacent rocks were of sedimentary origin, deposited under the bed of the ocean,

downward, nor within the surface lines, extended vertically downward, of any other claim of the Eureka Company. And that it is not upon any lode on its dip or otherwise, that has its top or apex within the surface lines, extended vertically downward, of the Champion or any other claim of the Eureka Company. And that the Richmond Company was in possession of the mining ground in dispute at the commencement of this action. That upon the law and these facts, the decree should have been in favor of the Richmond Company, and against the Eureka Company.

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The rock in which a lode occurs is called the country rock, or wall rock, and those sides next to the lode, the walls.

When the lode is not perpendicular, the wall over it is called the hanging wall, and the wall under it the foot wall.

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By keeping in view these simple definitions, but little difficulty will be experienced in arriving at just conclusions, if our view of the law in this case be correct.

The principal ore bodies found in this zone of limestone are fissure veins or lodes, and the limestone bounding these ore bodies forms the walls and wall-rock of the lodes.

Mr. Reed, Mr. Keyes, Mr. Hunt and Mr. Raymond, witnesses for the Eureka Company, and Messrs. King, Ashburner and Hague, witnesses for the defendant, all testified that this limestone zone and the adjacent rocks were of sedimentary origin, deposited under the bed of the ocean,

and raised to their present elevation by some great force of Nature.

Mr. Reed further testified that fissures were formed in this limestone zone, and that he supposed fissures were formed in the quartzite, by the force that raised these rocks to their present position; that the waters charged with carbonic acid came up from below through these fissures, and dissolved out portions of the limestone, enlarging the fissures, and forming caves and cavities; that the ores also came up from below in solution through these fissures, and were deposited in the fissures, caves and cavities in this way prepared for their reception.

(Transcript of evidence, p. 103, lines 6 to 42 inclusive.)

Mr. Reed further testified that there was a fissure or series of fisures, with smooth faces, striated, extending for hundreds of feet in depth, in the Richmond mine.

(Transcript of evidence, p. 127, lines 35 to 46 inclusive.)

Mr. Reed further testified that masses of the limestone were found lying within the ore bodies.

(Transcript of evidence, p. 104, lines 30 to 36 inclusive.)

Mr. Reed further testified that there were hundreds of feet of barren limestone between the ore bodies in this zone.

(Transcript of evidence, p. 112, lines 9 to 41, inclusive; and p. 113, lines 44 to 47, inclusive.)

Mr. Reed further testified that there was one hundred feet of barren limestone to one foot of ore in this zone.

(Transcript of evidence, p. 106, lines 21 to 26, inclusive.)

Mr. Keyes testified that the ore occurring in this zone was the filling of fissures, cracks, and cavities in the limestone, and that blocks of limestone had fallen into these cavities during the process of filling, and were surrounded by ore.

(Transcript of evidence, p. 185, lines 6 to 10, inclusive.)

Mr. Keys further testified that between the ore-bodies in this lode, the limestone was hard, compact, and barren.

(Transcript of evidence, p. 186, lines 32 to 46, inclusive)

Mr. Keys further testified that these barren zones of limestone were of considerable extent; that he thought there was one hundred feet of limestone to one foot of ore in the zone.

(Transcript of evidence, p. 186, lines 44, to 48, inclusive; and p. 187, line 1.)

Mr. Keyes further testified that subsequent to the formation of the fissures in this zone, water charged with carbonic acid, entered the fissures and dissolved out portions of the limestone, enlarging the fissures, and forming the large cavities and chambers in which the ore was subsequently deposited.

(Transcript of evidence, p. 187, lines 2 to 13, inclusive.)

Mr. Keyes further testified that there are fissures in the Richmond mine with smooth faces and marks of striation.

(Transcript of evidence, p. 197, lines 28 to 38, inclusive.)

Mr Raymond testified that he had seen something that resembled a wall aud fissure-planes in the Richmond.

(Transcript of evidence, p. 268, lines 3 to 48 inclusive; and p. 269, lines 1 to 31, inclusive.)

Mr. Raymond further testified that there were long, barren spaces between the ore bodies in this zone on single levels, taken by themselves.

(Transcript of evidence, p. 253, lines 16 to 22 inclusive.)

Mr. Hunt testified that the ore came up in solution from below, probably through veins and fissures, thousands of feet below the surface.

(Transcript of evidence, p. 282, lines 3 to 22 inclusive.)

Mr. Hunt further testified that there were fissures in this zone but not corresponding to the idea of true fissure lodes.
(Transcript of evidence, p. 289, lines 13 to 17, inclusive.)

Mr. Hunt also testified that there were certain clefts in the rock in the Richmond, but that they did not correspond with his idea of fissures.
Transcript of evidence, p. 289, lines 27 to 45, inclusive.)

Mr. Hunt further testified that there were joined planes in the Richmond, with smooth surfaces; fissure planes, without regularity.
(Transcript of evidence, p. 290, lines 40 to 48; inclusive, and p. 291, lines 1 to 3, inclusive.)

Mr. Westcoat testified that there was a fissure disclosed, passing down in the Richmond workings from the second level to the third, from the third to the fourth, and on the third level; that there are other fissures disclosed from the fourth down towards the fifth, and at different points from the fifth to the sixth; and from the sixth to the seventh the fissure can be followed all the way; and from the seventh to the eighth all the way; that most of the fissures have smooth faces, and show signs of motion, and in some places are striated; and that the Richmond vein or lode is what is called a pipe vein.
(Transcript of evidence, p. 369, lines 9 to 47, inclusive.)

Mr. Westcoat further testified that he made a calculation with Mr. Read, and that there was about two hundred feet of limestone in the zone to one foot of ore.
(Transcript of evidence, p. 596, lines 39 to 47, inclusive, and p. 597, lines 1 to 8, inclusive.)

Mr. Whitney testified that there were fissures or fissure-planes in the Richmond, and that they were the fissures which had given origin to the lode.
(Transcript of evidence, p. 425, lines 37 to 46, inclusive.)

Mr. Hague testified that the Richmond is a pipe-vein, and that it is formed within a fissure or fissures.

(Transcript of evidence, p. 434, lines 26 to 41, inclusive.)

Mr. Hague further testified that he could not find in the Eureka so clearly a connected fissure or system of fissures, as in the Richmond; but that he found lines of fissures traversing the limestone in the Eureka, connected more or less closely with the beds of ore; but was of the opinion that the ore bodies in the Eureka had a similar source with those in the Richmond, and are connected with a fissure or system of fissures.

(Transcript of evidence, p. 434, lines 42 to 48 inclusive, and p. 435, lines 1 to 43, inclusive.)

Mr. Hague further testified to fissure traces from the top of the Richmond down to the lower workings.

(Transcript of evidence, p. 464, lines 18 to 40 inclusive.)

Mr. Hague further testified that he would call the Richmond a fissure lode and pipe-vein.

(Transcript of evidence, p. 471, lines 5 to 34 inclusive.)

Mr. Hague further testified that he attributed the finding of ore in the quartzite to the fissures which had been opened mainly in the limestone; that those fissures have extended towards and to the quartzite in places, and at such points contact deposits had naturally resulted; that the fissures run diagonally across the limestone, and occasionally reach and touch the quartzite; and when that occurs a deposit of ore is sometimes formed on the quartzite.

(Transcript of evidence, p. 443, lines 9 to 19 inclusive.)

Mr. Hague further testified that there is a wide zone of barren ground within the zone lying between the Richmond and Eureka ore bodies.

(Transcript of evidence, p. 443, lines 37 to 49 inclusive.)

Mr. Hague further testified that the Richmond was a fissure lode, and that it was a typical pipe-vein.

(Transcript of evidence, p. 571, lines 6 to 36 inclusive.)

Mr. Hague further testified that the ore in this zone came up through two fissures or system of fissures.

(Transcript of evidence, p. 484, lines 29 to 48 inclusive.)

Mr. Ashburner testified that there was several hundred feet of barren limestone between the deposits of ore in the Eureka and those in the Richmond, and that in his opinion they are not in the same fissure or system of fissures.

(Transcript of evidence, p. 500, lines 39 to 48 inclusive, and p. 501, lines 1 to 5 inclusive.

Mr. Ashburner further testified that the limestone in those places where it is barren is entirely destitute of ore; that it is simply solid compact limestone as a rule; that in some places it is fissured, but as a rule it is solid and compact.

(Trancript of evidence, p. 503, lines 26 to 32 inclusive.)

Mr. Ashburner further testified, in answer to questions put by his Honor, Judge Sawyer, that the limestone was much softer and more easily soluble than the quartzite; that in all limestone countries it is very common to find large excavations which have been dissolved out by waters containing carbonic acid; that he did not think that the vapors in which the ore came up, came up on the line of contact between the quartzite and limestone; that the limestone being much softer than the quartzite, it was more fissured, and the vapors came up through the limestone.

(Transcript of evidence, p. 505, lines 11 to 32 inclusive.)

Mr. Ashburner further testified that the Richmond was a pipe-vein.

Clarence King testified that the period at which the fis-

sure which contains the Richmond lode was formed may not be determined.

(Transcript of evidence, p. 537, lines 35 and 36.)

Mr. King further testified that the Richmond fissures are seen in various workings of the mine.

(Transcript of evidence, p. 539, lines 43 to 48, inclusive; and p. 540, lines 1 to 48, inclusive; and p. 541, lines 1 to 5, inclusive; and lines 26 to 49, inclusive; and p. 542, lines 1 to 24, inclusive.)

Mr. King further testified that the lodes were pipe-veins.

(Transcript of evidence, p. 545. lines 28 and 29.)

Mr. King further testified that the solutions from which the ore was deposited came up through fissures in the limestone; that the fissures in the limestone give out upon reaching the quartzite, so far as known; and that the limestone fissures are the lodes; and that the limestone between the lodes is generally a compact limestone, and exhibits no trace of the metals generally away from the ore bodies.

(Transcript of evidence, p. 555, lines 20 to 39, inclusive.)

It is clear, from this evidence, that the bodies of ore in this zone of limestone are veins or lodes, in the sense in which those terms are used in works on mining and mining geology. They are aggregations of mineral matter in fissures of rocks. The fissures were opened diagonally across the zone, were subsequently enlarged, and considerable cavities were formed along their line by the passage of the waters containing carbonic acid through them. They were subsequently filled with valuable ores containing gold and silver. The limestone forms the walls of the lodes, and the usual intervening space of barren rock is found between the lodes. Occasionally the fissures have touched the quartzite, and the limestone has been dissolved out at the point of contact between the limestone and the quartzite,

and in several instances bodies of ore have been deposited of considerable size, between the quartzite and limestone. But these are exceptional cases. The principal bodies of ore and far the greater number, being found enclosed on all sides by the limestone.

Masses of the limestone have fallen into the fissures before the ore was deposited or while it was being deposited, and are found entirely surrounded by the ore. We have, then, all of the conditions of fissure veins. The fissures formed in the pre-existing rock, the ores subsequently coming up from below in solution and filling the fissures and the usual loose masses of country rock within the lode generally called horses.

This is the view the Judges who tried the case evidently took. In the written opinion filed they use the following language:

"If the scientific definition of a lode, as given by geologists, could be accepted as the only proper one in this case, the theory of distinct veins existing in distinct fissures of the limestone would be not only plausible, but reasonable, for that definition is (not) met by the conditions in which the Eureka mineralized zone appears. But as that definition cannot be accepted, and the zone presents the case of a lode, as that term is understood by miners, the theory of separate veins as distinct and disconnected bodies of ore falls to the ground. It is, therefore, of little consequence what name is given to the bodies of ore in the limestone, whether they be called pipe-veins, rake-veins, or pipes of ore, or receive the new designation suggested by one of the witnesses, they are but parts of one greater deposite, which permeates, in a greater or less degree, with occasional intervening spaces of barren rock, the whole mass of limestone, from the Jackson mine to the Richmond, inclusive."

(Opinion of the Court, Transcript, p. 608, lines 5 to 19, inclusive.)

The words vein or lode, as applied to deposites of ore, originated or received their first application in England, We received those terms witht heir accepted definition along with our language and laws, from the mother country; and unless that definition has been changed in this country in some way recognized in law, we must look for a correct definition to the country from which we borrowed the words. In England, in works on mining and mining geology, we find the words defined with sufficient accuracy, and applied to a class of ore bodies closely resembling the lodes found in this zone of limestone. The zones of limestone in which the lead lodes of Derbyshire and Cumberland occur, like this zone, are of sedimentary origin, as all limestones are. Those lodes, like the lodes in this zone, occur in irregular fissures. In many cases the fissures, and in all cases the productive portions of the fissures, are confined to the zones of limestone. The term "pipe-vein" is applied to a vein in the north of England, which is described as a huge, irregular cavern, pushing forward into the body of the earth in a slanting direction.

(Student's Manual of Geology, by J. Bette Jukes, pp. 297–298; Von Cotta's Treatise on Ore Deposits, Prime's translation, pp. 450 to 436, inclusive.)

Conceding that the Richmond ore-body is a vein or lode, according to the definition of those terms, as used in the books, and this must be conceded upon the evidence and the best authorities, the Richmond Company, by virtue of the location of the Richmond lode, under the acts of Congress, of July 26, 1866, acquired title to the lode with the right to follow it on its dip, *i. e.*, at right angles to its strike, to any depth, although it may enter the land adjoining if the definition had not been changed in some way before the passage of that act.

Had the definition of the terms vein or lode been changed in this country before the passage of the Act of Congress of July 26, 1866?

The Eureka Company contends that it had been changed by the usages and customs of the miners, but at what time does not appear from the evidence, neither do the localities in which it has been changed appear.

Mr. Keys testified upon this point that he maintained that according to the customs of miners, the usages of miners in this country, according to good mining policy, and according to common sense, the whole of this space should be considered and accepted as a lead, lode or ledge of metal-bearing rock in place; that for all practical purposes of law, custom, and common sense, that this zone *should* be considered a lead, lode or ledge of metal-bearing rock in place.

(Transcript of evidence, p. 154, lines 17 to 21, inclusive; and lines 33 to 37, inclusive.)

Mr. Keyes testified further upon cross-examination, that he meant by the terms miner's usages and miner's customs, that the miners were endeavoring to crystalize out into form an accepted definition; that the best of them were trying *now* to have determined what should constitute a lode; that it was a progressive art; that the miners had not altered their laws in the Eureka Mining District; that they had the assistance of a gentleman from Freyburg to help them make the laws as they then stood, but that in groping after truth he had changed his mind; that under the mining laws of Eureka, just such deposits as those in this zone might be located as square or deposit claims; that all of the claims of the Eureka Company had been located as square or deposit claims except the Lupita, but that subsequently they had been located as lode claims; that so far as the miners of the Eureka District were concerned, they had not yet brought their rules and customs exactly up to

the mark of claiming that *whole zone or any other zone, as one lode.*

Professor Raymond testified that, in his judgment, this zone should be considered practically a unit or a single ore deposit.

(Transcript of evidence, p. 215, lines 24 to 29, inclusive.)

Professor Raymond further testified that it is a consequence of the *symptoms* and character, which taken together and carefully weighed, that in his judgment this deposit is to be considered a single vein in the sense in which the word vein, is used by miners; that is, as a single ore deposit of identical origin, age and character throughout.

(Transcript of evidence, p. 218, lines 4 to 13, inclusive.)

Professor Raymond further testified that he would be justified in naming the zone a contact vein.

(Transcript of evidence, p. 229, lines 23 to 34, inclusive.)

Professor Raymond further testified that the zone was a single formation or body of rock that had been impregnated and affected throughout, at the same period, by the same influences, so as to produce practically a single ore deposit. I use the word practical to distinguish it from the word theoretical, which would refer it to the definition given in the books.

(Transcript of evidence, p. 266, lines 45 to 48, and p. 267, lines 1 to 12, inclusive.)

Professor Raymond further testified, that his reasons for considering the zone a *practically* single vein were not based upon the history of the deposition of the ore.

(Transcript of evidence, p. 272, lines 21 to 26, inclusive.)

Professor Hunt testified:

"I conclude, therefore, that this great mass of ore is, in the proper sense of the word, a great lode or a great vein,

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Professor Hunt testified:

"I conclude, therefore, that this great mass of ore is, in the proper sense of the word, a great lode or a great vein,

in the sense in which the word is used by miners, and that practically the only way of utilizing this deposit is to treat the whole of it as one great ore-bearing lode or mass of rock."

(Transcript of evidence, p. 284, lines 25 to 28, inclusive.)

Professor Hunt testified further:

Therefore I repeat that it seems to me, whether we look at the position of this ore in the rock, whether we look at the theory of its origin, or whether we look at the conditions which present themselves to the practical miner, who must regard this great mass of crushed limestone with layers, and its masses of ore, as one great ore-bearing mass of material, as a unit, to be considered as one great lode or ledge of ore-bearing matter.

(Transcript of evidence, page 284, line 48, and page 285, lines 1 to 7, inclusive.)

Professor Hunt further testified that he had never been on this coast before; that in his opinion a mine [zone] of ore-bearing rock like that, was, according to miners' usages, entitled to be called a lode; that he had some knowledge of the literature of mining, although he had not been familiar with mining on this western coast; and that he was not competent to discuss mining laws; that he must plead ignorance of it.

(Transcript of evidence, page 300, lines 17 to 30, inclusive.)

Professor Hunt further testified that he did not know much about the opinions of miners in reference to mines, and what their usages and customs are on this coast.

(Transcript of evidence, p. 300, lines 40 to 47, inclusive.)

The Judges who tried the case say, in their opinion, in stating the substance of the testimony of Mr. Keyes, Mr. Raymond, and Professor Hunt:

"The three scientific experts produced by the plaintiff—Mr. Keyes, Mr. Raymond, and Mr. Hunt, all of them of large experience and extensive attainments, and two of them of national reputation, have given it as their opinion, after examining the ground, that the zone of limestone between the quartzite and the shale constitutes one vein or lode, in the sense in which those terms are used by miners. Mr. Keyes, who for years was superintendent of the mine of the plaintiff, concludes a minute description of the character and developments of the ground, by stating that, in his judgment, according to the customs of miners in this country, and common sense, the whole of that space should be considered and accepted as a lead, lode, or ledge of metal-bearing rock in place.

"Dr. Raymond, after giving a like extended account of the character of the ground, and his opinion as to the causes of its formation, and stating with great minuteness the observations he had made, concludes by announcing as his judgment, after carefully weighing all that he had seen, that the deposit between the quartzite and the shale is to be considered as a single vein in the sense in which the word is used by miners—that is, as a single ore deposit of identical origin, age, and character throughout. Dr. Hunt, after stating the result of his examination of the ground, and his theory as to the formation of the mine, gives his judgment as follows: * * * * * * * *

"I conclude, therefore, that this great mass of ore is, in the proper sense of the word, a great lode, or a great vein in the sense in which the word is used by miners; and that practically the only way of utilizing this deposit, is to treat the whole of it as one great ore bearing lode or mass of rock."

(Opinion of Court, Transcript, p. 606, lines 28 to 47 inclusive.)

The Court further says:

"Those acts were not drawn by geologists, or for geologists; they were not framed in the interests of science, and consequently with scientific accuracy in the use of terms. They were framed for the protection of miners in the claims which they had located and developed, and should receive such a construction as will carry out this purpose."

(Opinion of Court, Transcript, page 604, lines 21 to 26 inclusive.)

The definition cannot be changed by the miners alone.

The law was not made for the special protection of any class. By the Act of Congress of July 26, 1866, the mineral lands of the United States were declared to be free and open to exploration and occupation by *all* citizens of the United States and those who had declared their intentions to become such. And by the Act of May 10, 1872, substantially the same provision was re-enacted.

The law is general in its terms and operation, and extends the privilege not to the miner alone, but to all alike, to explore, occupy and purchase the valuable mineral lands of the Government.

Large capital is required to work a mine. "It takes a mine to work a mine," is a familiar phrase. As a rule the valuable and productive mines of this country are owned by corporations generally incorporated in our large cities away from the mining districts. The stock of those corporations is largely owned by the farming, manufacturing and mercantile classes of the country.

The law was made to protect these classes as well as the miners. It was the representatives of these classes in Congress in the main who passed these laws. Is it probable that they did not have in view the protection of the rights of their immediate constituents as well as the rights of the miners? Would they be likely to pass a law resting vast

property rights upon the vague, local and unsettled definition of words invented by miners to suit crude theories as to what is or is not a lode?

The results of the construction given to the acts of Congress by the Circuit Court would be mischievous beyond calculation.

Nearly all of the mines in the United States are found in sedimentary rocks, originally laid down under the ocean, or under large bodies of fresh water, in horizontal strata. Subsequently these rocks, like those in the Eureka district, have been raised by some great natural force to considerable elevations above the level of the sea, generally several thousand feet, and crumpled up into mountain folds. Usually the strata are tilted up at considerable angles to the plane of the horizon, the edges appearing at the surface. In this position they form zones of limestone, shale, quartzite, slate, and other rocks, running through the country. Mountain ranges traverse the State of Nevada throughout its entire length and breadth. Upon the sides of these mountains tens of thousands of lodes have been found and located. California, Montana, Idaho, New Mexico, Arizona and Colorado are similarly situated.

Each of these zones, as a matter of course, is bounded upon either side by dissimilar rocks, forming, according to the definition of the witnesses of the Eureka Company in this case, the foot-wall and hanging-wall of the zone. Most of these zones contain lodes and isolated ore-bodies, and are mineral-bearing zones, in the sense in which that term is generally used.

Clarence King testifies that most of the rocks in this State, in these mountain-ranges, have been crushed and fissured during their elevation and crumpling into mountain folds similar to the manner in which this zone is found crushed and fissured. We have, then, in any one of these mineral-

bearing zones all of the essentials of a lode or vein, according to the construction of the Acts of Congress by the Circuit Court in this case. Nothing more is needed but the testimony of mining experts that, according to the usages and customs of miners and common sense, the zone should be called a lode, to enable the oldest locator of a subordinate lode within the zone to claim and hold the entire zone.

To depart from long-established and well-settled definitions of the terms vein and lode, as found in works on mining and mining geology, written by men who had no private ends to subserve or individual interests to advance, but who wrote in the interest of science solely, and receive definitions from the mouths of mining experts, would be to introduce uncertainty for certainty, and unsettle all mining title to mining claims in all mineralized zones. No better illustration of what will happen, should such a rule of construction be adopted, than is afforded by this case can be found.

The miners have not by usage, custom or otherwise, changed the definition of the terms vein or lode.

This zone is not a vein or lode, according to the usages or customs of miners.

Mr. Hunt testifies that the miners of Ruby Hill are *Sui generis*.

Transcript of Evidence, page 280, lines 45, 46, 47, 48, and page 281, line 1.

The testimony of all the witnesses for the Eureka Company is substantially to the same effect.

If these mines are unlike any found elsewhere, we must ascertain what the miners of the Eureka district in which they are situated called them. What their usages and customs in referenee to them were, in order to determine whether according to the usages and customs of miners, this zone is or is not a lode.

The Eureka Mining District was formed in 1864, and mining laws were adopted, making the usual provision for lode locations. Transcript, page 657.

After an acquaintance of over four years with the District, the miners, in the language of the preamble to their amended laws, concluded "that explorations had made it evident that the mineral in Eureka District is found more frequently in the form of deposists than in fissure veins and ledges."

Now, is it not somewhat singular that the miners of this district had never heard that according to the *usages and customs* of miners, a zone of rock containing lodes and isolated deposits of ore, was also a lode and that it had never occured to them that this zone of limestone on Ruby Hill, according to common sense and for practical purposes, should be considered a lode?

Well, they followed up their preamble by amending the laws so as to authorize the location of deposit or square claims.

(Transcript, p. 657.)

And, under the amendments all of the claims of the Eureka Company except one, were located as deposit or square claims.

The miners of the district had not yet learned that under the Act of Congress they could locate half a dozen lodes in one claim by simply locating the whole zone containing them, as a lode.

Subsequently they were located as lode claims. In the course of time the title passed to the Eureka Company; but the Eureka Company remained as blind to the true construction of the Acts of Congress as the locators of the claims had previously been, notwithstanding the fact that

the Company had Mr. Keys, one of its witnesses in this case, for a superintendent.

Mr. Keys, sometime after taking charge, made a report to the Richmond Company, then about to purchase the Richmond claim, upon that zone. At that time, in the opinion of Mr. Keys, the Richmond lode was only about 250 or 300 feet wide on the surface, instead of 800 or a thousand feet, and it had a limestone cap or hanging wall of limestone, instead of one of shale.

(Transcript of evidence, p. 170, lines 42 to 48 inclusive; and p. 171, lines to 17 inclusive; and p. 172, lines 24 to 41 inclusive; and p. 174, lines 27 to 48 inclusive; and p. 175, lines 1 to 6 inclusive.)

The Eureka Company next applied for patents, not for the whole zone as a lode, but for the Sentinel lode and for surface ground on each side of the lode, and for all other veins or lodes throughout their entire depth, the top or apex of which lay inside the surface lines of the claim, extended downward vertically, etc., and the same kind of applications were made for patents to the Nuget, the Champion, the At Last, the Lupita, the Buckeye, the Mammoth and the Elliptic; and Mr. Reed, another one of the witnesses for the Eureka Company, then a deputy United States Mineral surveyor, made the surveys for these patents, and reported to the Land Department of the Government that the lode was found *in* coraline limestone; not that the whole zone between the quartzite and shale was a lode.

(Transcript of evidence, p. 110, lines 9 to 38 inclusive.)

One of the patents of the Eureka Company, that to the Lupita claim, was issued after this action had been commenced.

Can there be any doubt upon these facts that the miners

and owners of mining claims on this zone have always regarded the ore bodies within the zone as distinct and separate lodes and ore bodies, and that the zone has never been regarded or treated as a vein or lode.

In 1872, the Richmond Company followed the Richmond lode on its dip under a mining claim owned by the Eureka Company. The Eureka Company wanted the ore, and in May, 1873, proved that the Richmond claim was located on a deposit, not a lode.

(Transcript of testimony, p. 557, lines 37 to 48; and p. 558, lines 1 to 10, inclusive.)

In 1876, the Richmond Company followed its lode on its dip into the ground in dispute. The Eureka Company wanted the ore, and in 1877, proved that there was a lode over one thousand feet wide on the surface, covering all of the ground in controversy in the previous action, and more, and that the Richmond was located on it.

It is truly astonishing how the sight of an ore body containing three or four millions of dollars sharpens the faculties of mining men. This lode, supposed to be at the utmost not more than 40 or 50 feet wide in 1873, under the stimulating effect of important ore discoveries on its dip, expanded to a lode of one thousand feet in width in 1877, and it is not impossible that should large and valuable bodies of ore be discovered still further to the northeast, that it will expand to still more magnificent proportions.

Mr. Hunt in his testimony leaves abundant room for it to do so.

(Transcript of testimony, p. 284, lines 16 to 24, inclusive.)

Under the construction that the Acts of Congress used the terms veins and lodes in the sense in which those terms are understood by miners, and that the Courts will not be guided by books on mining and mining geology in determin-

ing the sense in which those terms are understood by miners, and have been understood for hundreds of years, but will gather the meaning from the mouths of mining experts; and under the further construction that a zone of rock containing distinct veins or lodes, with great barren spaces between, may also be a lode in the sense in which that term is used in the Acts of Congress, and that the greater includes the lesser, all limits to the size of lodes are swept away. Zones are found a mile wide, containing lodes, and irregularly impregnated with ore, and the locator who locates a lode within the zone one foot wide may, by virtue of his location and hard swearing, hold a claim a mile wide.

It is generally known to intelligent men that ore bearing zones of rock, and I use the phrase as it is generally used to describe zones that contain numerous lodes, are frequently thousands of feet wide; that they occur in every quarter of the globe. It must be presumed that members of Congress knew this fact when the several mining acts were passed. If it had been the intention of Congress by those acts to authorize the location of zones as lodes, claims to surface ground would not have been limited as a maximum to three hundred feet on each side of the centre of the lode.

It was well known to Congress that lodes approach a tabular form, and rarely exceed a few feet and at most not more than a few hundred feet in width, and the Acts were intended to cover that class of ore deposits.

The ores of quicksilver do occur in lodes and veins, sometimes as cinnabar and sometimes as native amalgam.

> Von Cotta's Treatise on Ore Deposits, pages 200, 201, 202, and pages 399, Sec. 226, and pages 400 and 401.

Gold, silver, copper and quicksilver all occur in veins or lodes.

It has been the policy of the Government to prevent monopoly in the location and occupation of the public mineral lands.

The Mining Act of July 26, 1866, provided, that no location or patent should cover more than one vein or lode.

The construction given to the law by the Circuit Court in this case, is in opposition to this policy and nullifies the law in both letter and spirit.

The Court holds, that many lodes may be located in one claim by locating the zone containing them as one lode.

If more than one lode may be located in one claim, by locating a zone one thousand feet wide as a lode, a hundred or a thousand lodes may be located in one claim by locating a zone two or three miles wide as a lode.

The Act of Congress of May 10, 1872, gives to the locator of a lode not less than 25 feet, and not *more* than 300 feet of surface ground on each side of the lode located and all veins and lodes, the top apices of which lie inside of the external limits of his surface claim extended downward vertically, etc.

Under no construction of the Act of Congress, can the locator be entitled to *more* than his 300 feet on each side of the centre of his lode, or any veins or lodes the tops or apices of which lie inside of the exterior limits of his surface claims extended downward vertically.

But under the construction given to this Act by the Circuit Court, by locating a zone as a lode, he is entitled to all lodes found within the zone without reference to its width, or whether the tops or apices lie inside of the prescribed surface limits or not.

The words vein and lode must be taken according to their ordinary grammatical sense.

See Edrich's case, 5 Cr., p. 118;

Jones vs. *Harrison*, 6 Exch., 328, 333;

S. C. Q. Lowndes' Man'l. p. 257 :

Miller vs. *Harrison*, 20 Wend, 555, 556, 557 :

The dip of the Richmond lode is northeast and the dip of the limestone is northeast, and the ground in dispute is included within lines drawn vertically down through the end lines of the Richmond extended on the dip from the Richmond claim.

The Richmond Company has the right to follow the Richmond lode on its dip to any depth.

Act of Congress, July 26, 1866, Sec. 2 :

Act of Congress of May 10, 1872, Sec. 16.

Upon the other points involved in this case, reference is made to the authorities cited in the brief in the action of ejectment between the same parties, and general reference is made to said brief.

THOS. WREN AND
S. M WILSON,
Counsel for Appellant.

OFFICE SUPREME COURT U.S.
FILED
MAR 2 1901
JAMES H. McKENNEY, Clerk

In Supreme Court of the United States.

The Richmond Mining Company of Nevada, *Plaintiff in Error.* *vs.* The Eureka Consolidated Mining Company, *Defendant in Error.*	No.	Writ of Error.
The Richmond Mining Company of Nevada, *Appellant,* *vs.* The Eureka Consolidated Mining Company, *Appellee.*	Nos	Appeals.

BRIEF FOR DEFENDANT IN ERROR AND APPELLEE.

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In Supreme Court of the United States.

The Richmond Mining Company, of Nevada, *Plaintiff in Error,* *vs.* The Eureka Consolidated Mining Company, *Defendant in Error.*	No.	Writ of Error.
The Richmond Mining Company, of Nevada, *Appellant,* *vs.* The Eureka Consolidated Mining Company, *Appellee.*	Nos.	Appeals.

Statement of the Cases.

The first of these cases is Ejectment, brought by the Eureka Company against the Richmond Company, for a portion of a lode and mining ground bearing gold, silver, and other valuable minerals, situated

in the Eureka Mining District, in the State of Nevada. The Richmond Company, in its answer, denies the title of the Eureka Company and alleges title in itself to certain mining lands and premises, embracing the premises sued for.

The two other cases are in Equity, one brought by the Eureka Company against the Richmond Company, and the other by the Richmond Company against the Eureka Company, for an injunction to prevent mining on the premises in controversy, and to preserve the same for the true and lawful owner.

These suits in Equity are auxiliary to the case at law, in which the title is to be established.

By agreement, a jury was waived in the law case, and the suits were tried before the Hon. Stephen J. Field, Presiding Justice, the Hon Lorenzo Sawyer, Judge of the Ninth Circuit, and the Hon. E. W. Hillyer, Judge of the District of Nevada. The testimony was taken in the law case in open court before the Presiding Justice and the Circuit and District Judges, and a very incorrect and incomplete report of it in writing filed in the equity cases. The Presiding Justice and the Judges determined unanimously the facts and the law in the ejectment case, as appears in the Decision and the Findings in the record of that case in this court, and rendered judgment in favor of the Eureka Company for the premises in controversy; and necessarily following this, a decree was made in equity in the suit of the Eureka Company against the Richmond Company, perpetually enjoining the Richmond Company from mining upon the said premises; and

in the suit brought by the Richmond Company against the Eureka Company for an injunction, a decree was made dismissing the bill on the merits.

The Ejectment Case.

In this, the facts are found.

Record, Findings, pp. 27,–32 ;
Exhibits, pp. 32,–78 :
Decision, pp. 13,–27.

It is found that the maps marked "*U*" and "*V*" are substantially correct.

They represent the ground in controversy and sufficient of the surrounding locality for the necessary purposes of the case.

It is found that the Champion patent was issued to the Eureka Company, July 16th, 1872.

The Lookout patent to the Eureka Company, July 16th, 1872.

The At Last patent to the Eureka Company, Dec. 12th, 1876.

The Nuget patent to the Eureka Company, Dec. 12th, 1876.

The Lupita or Margaret patent to the Eureka Company, March 30th, 1877.

That the Richmond patent was issued to the Richmond Company, April 30th, 1874.

The Tip Top patent to the Richmond Company, April 30, 1874.

That in 1873, the applications were made for the Richmond and Tip Top patents.

That the Lookout location was made, May 29th, 1869.

That the Richmond location was made September 20th, 1869.

That the Champion location was made May 23rd, 1870.

That the Arctic location of the Richmond Company, (unpatented,) was made Oct. 2d, 1876.

That the Utah location of the Richmond Company, (unpatented,) was made Jan'y 7th, 1877.

That the Lookout patent and ground was sold by the Eureka Company to the Richmond Company June 16th, 1873.

That a *lode* or *ledge* of metal bearing rock in place, extends for over a mile in a general northwesterly and southeasterly direction along and through Ruby Hill, in Eureka Mining District; upon which lode or ledge all these patents are located.

"17. That the mining ground in dispute, is situated within the lode or ledge, as hereinbefore described, and within planes drawn down vertically through the end lines of plaintiff's patented location of the Champion claim, and within planes drawn vertically down through the extreme points of the patented locations of the At Last, and the Lupita or Margaret claims, at right angles to the course or strike of the said lode or ledge, and produced so as to fol-

low the dip of the lode. The top or apex of said lode is within the surface lines of said patents to the plaintiff, and said lode dips at right angles to its course, and on such dip extends under the surface of the Utah and Arctic claims of defendant."

As seen on the maps, a plane drawn through the western end lines of the Champion, At Last and Margaret or Lupita patents, which is found to be at right angles to the lode, is coincident with a plane drawn through the eastern end lines of the Richmond and Lookout patents.

It is contended for the Richmond Company that as its location was made under the law of 1866, which did not require marked end lines, and was prior to the Champion, At Last and Margaret or Lupita locations of the Eureka Company; and as all of its rights under that law and location were expressly preserved by the act of 1872, and as, under the law of 1866, it was entitled to end lines at right angles to the course of the lode, it is not bound by the end line of the Richmond patent or by the end line of the Champion patent, and is entitled to the ore of the Pott's Chamber on the easterly side of the plane of that line.

This is entirely answered by the findings that the limestone zone is a lode or ledge, and that the coincident end line of the Richmond and Champion patents is at right angles to the course of the ledge.

In *Mining Company* vs. *Tarbet*, 8 Otto, 463, the locations were under the act of 1866 (pp. 466, 467). Similar arguments were presented to those pressed

by the counsel for the Richmond here—that under the act of 1866 the main thing was the vein and the surface merely incidental—that the act of 1872 changed this and made the surface controlling, but reserved all rights of location under the act of 1866 —that the patent, after the act of 1872, on a location under the act of 1866, granted so many linear feet of the original lode, and the surface described, and a certain portion of all other lodes having their top or apex in the surface lines; but the court held that the intent of the act of 1872 is undoubtedly the same as that of the act of 1866, but more explicit in its terms —that the grant could only be of the original lode, and of all other lodes, for the linear feet within the end lines and side lines, and the right to follow down the dip of those linear feet; and that after lines are fixed and patents obtained this consequence would follow irrespective of the priority of the location; all would depend on the question as to what part of the vein the respective locations and patents properly cover and appropriate.

Now, it is contended on the other side that under the act of 1866, if before the course of the vein was exposed, the notice of location erroneously described it, the location could afterwards be made to conform to the actual course of the vein. It has even been held that under the act of 1872 a reasonable time would be allowed the locator after discovery and first acts of location to determine the course of his lode before the final fixed location of it. But the reasons which apply in such cases do not apply after applica-

tion for patent. Whether the application was under the act of 1866 or 1872 the lines of a tract of land embracing the lode had to be fixed by marks on the ground, and by survey. The claimant himself selected his ground and fixed his lines; he purchased by the acre, and could not buy the line of the lode simply; the entry was of the tract, and the patent of the tract and of the lode within it. He was not required to mark his lines until the lode was developed in its course; and after marking his lines and applying for and obtaining a patent, he is bound by his lines and by his patent, and is estopped from claiming any part of the lode outside of his lines, except upon its dip from the linear feet embraced within his lines.

Under the act of 1866, a locator claiming so many linear feet of the lode without indicating the direction of his end lines (and before proceeding for a patent), was entitled to end lines at right angles to the course of the lode; yet, if he did mark the direction of his end lines, he was bound thereby.

The argument of counsel goes to overthrowing both acts—the object of which was to establish titles—not to leave them in the same uncertainty and subject to the same *swinging* as before legislation on the subject.

Moreover, this argument as to the saving of vested rights by the provisos of the law of 1872, has this vice. It ignores the explicit declaration of the law of 1872 (Sec. 3), that in all locations *theretofore* made, the end planes should control. This express and peremptory provision cannot be countervailed by any general and vague saving clause. The saving clause

has enough to operate on, by applying it to *other* existing rights, which otherwise might have been repealed, contrary to the intention of the law-makers, but it cannot abrogate this expressed and positive declaration.

But there never was any right under the act of 1866 to follow the lode outside of the planes of the end lines ~~under : (Sec. 2)~~ the end lines were to be marked upon a diagram by the claimant at his peril, and binding upon him when marked; and the right given (in the act of 1866) was the same as that given in the act of 1872, to follow on the dip into the land adjoining over the dip and in front of that portion of the lode granted.

But if this could be otherwise, the act of 1872 was only fixing a boundary line which Congress had the power to do, and in Sec. 3, act of 1872, it in terms fixed this boundary line for locations *theretofore* made. Under the Statute of Frauds, boundary lines could be fixed by parol. The fixing of them confiscates no right, destroys or conveys no property.

Again in case of the Champion and Richmond and Tip-Top patents conflicting, the Champion must prevail in ejectment, because issued before the Richmond application for patent was made.

The law provides for notice to opposing claimants, for adverse claims to be filed within a given time, for a trial with conflicting claims in a competent court.

When the adverse claimant fails to appear or is defeated, the patent issues. Any adverse claimant has then had his day in court. A judgment has been

rendered against his claim whether it be older or younger. He cannot afterwards obtain a patent, and in action of ejectment re-open the question of prior or better right. But counsel on the other side, say that no protest was required, because the Champion application was for the Champion lode, and the Richmond for the Richmond lode, and there was no conflict of surface.

The finding is of *one* lode with its course at right angles to the end lines of the Champion patent. In such case there could have been no conflict of lode or surface; and the Eureka Company would be entitled to judgment now without question.

But if there was one lode, with a course, as claimed by the Richmond, there would be a conflict as to a portion of the lode and surface both; and if two lodes with the course of its lode, as claimed by the Richmond, there would be a surface conflict.

The act of 1866 did not require application to be made for patent, but would reward the most diligent in making application, The Champion application was made under that act. A *tract* of land had to be laid out for patent, and the patentee only took that portion of the lode in its course within his lines and the dip therefrom. When the Champion made its diagram showing its surface claim as it is, the Richmond should have made its diagram with end lines at right angles to the course of its lode, as it claims the course, and that would necessarily have shown a conflict of surface if the lodes were different—of lode and surface if there was one lode. A protest filed as

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required by law would have compelled the Champion to conform to its Richmond end lines if the Richmond was the oldest and a valid location, and if its claim as to the course of its lode was correct.

II.

The end lines of the Nuget, At Last, and Margaret or Lupita patents are not parallel.

The provision of law on this subject is directory.

To quote from the decision of the Court below:

"In the first place, it does not appear upon what locations the patents were issued. They may have been, and probably were, issued upon locations made under the act of 1866, where such parallelism in the end lines of the surface locations was not required. The presumption of the law is that the officers of the Executive Department, specially charged with the supervision of applications for mining patents and the issue of such patents, did their duty; and in an action of ejectment, mere surmises to the contrary will not be listened to. If, under any possible circumstances a patent for a location without such parallelism may be valid, the law will presume that such circumstances existed. A patent of the United States for land * * * is something upon which its holder can rely for peace and security in his possessions. In its potency it is ironclad against all mere speculative inferences. No consequence is attached to a deviation from this direction. Its object is to secure parallel end lines drawn vertically

down, and that was effected in these cases by taking the extreme points of the respective locations on the length of the lode. In the third place, the defect alleged does not concern the defendant, and no one but the Government has the right to complain."

If held mandatory, it would defeat the sale of much of the mining land and prevent the miner from taking, in *very many* instances, unoccupied portions of the lode.

Suppose two locations—parallelograms 1,500 feet long and 600 feet wide—touch each other and then diverge so as to leave a triangle between them; shall the triangle not be located and patented? And practically and really, as suggested by the court below, no matter what the shape of his surface location, the locator acquires the linear extent of the lode embraced within his lines and that portion of the dip at right angles thereto—making, perforce, in every event, parallel end lines for his part or section of the lode.

And the non-parallelism of the end lines of these patents is also immaterial to the Richmond Company, because the end lines of the Champion are parallel and at right angles to the lode, and the Champion patent was issued before the Richmond patent was applied for and without any successful protest or adverse claim asserted by the owners of the Richmond claim.

The top or apex of the lode is found to be in these patents, to wit: the Champion, At Last, and Margaret of the Eureka Company.

If this finds the top or apex in the three patents,

and this indicates that it is wider than the Champion patent lines, still that patent would carry the entire width of the lode, because so many linear feet of the lode is granted in its entirety, and also the surface and also so much of all other lodes having their top or apex in the surface lines.

I am aware that it has been held that a patent not so wide as the lode would not carry the width of the lode, but this is contrary to the intention and provisions of the law, and makes a result absurd from the physical impossibility of dividing a lode with its contracting and expanding side boundaries and varying dips into slices cut down along its course.

III.

Do the facts found sustain the conclusion of one *lode* or *lodge?*

Reference is made to the Decision and Findings on this subject, in full. Record, pages 27–29, 13–20.

For legal definitions of a lode, under this Congressional legislation, we have one referred to and quoted by Mr. Justice MILLER, in his charge to the jury in the Iron Mine case, in the Circuit Court in Colorado, in these words:

"I am aided also by my brother Hallett, whose experience is greater than mine in this matter, and who has also given the definition of the word, which I propose to read to you as the law. "*In general, it may be said that a lode or vein is a body of mineral, or mineral body of rock, within defined boundaries*, in the general mass of the mountain;" and

I do not know a better and more comprehensive definition than that."

Mr. Justice MILLER also charged the jury in that case in these words:

Now, gentlemen of the jury, as I make out the subject matters to be considered by you in this case, the first one of them for you to determine, what is a vein, lode or ledge of mineral matter within the meaning of the statute, and in regard to that matter, I apprehend you will have no great difficulty in this case. The statute of the United States, in determining the terms on which its mineral lands shall be sold, used or occupied, have divided mineral lands—at least all that relate to precious metals—into two distinct classes; they are those which are called placer mines, and those which are called veins, lodes or ledges of mineral matter in quartz or other rock in place. Section 2,329 of the Revised Statutes of Congress, says:

"Claims usually called 'placers' including all forms of deposit, excepting veins of quartz and other rock in place, will be subject to entry or patent under like circumstances and conditions." Therefore it divides all these lands, all of which are capable of being patented, into two classes—placer mines and quartz or other rock in place, and, the question you have to determine in this case is whether that sheet of mineral matter about which witnesses have been testifying for over a week, is a placer mine, or is mineral matter of quartz, or other rock in place. The statute seems to have been intended to be pretty liberal, and to use several terms as to what constitutes mineral matter in place. Section 2,320 says that, "mining claims upon veins or lodes of quartz or other rock in place, bearing gold, silver, cinnabar, lead, tin, copper, or other valuable deposits, heretofore located, shall be governed, etc." The phrase there is veins or lodes of quartz or other rock in place bearing gold, silver, cinna-

bar, etc. Section 2,322—the important section upon which almost the whole of this case depends, says: "The locators of all mining locations heretofore made, or which shall hereafter be made, on any mineral vein, lode or ledge situated on the public domain." Now, there they use another phrase, vein, lode or ledge. Again: "And nothing in this section shall authorize the locator or possessor of a vein or lode which extends in its downwardcourse beyond the vertical lines of his claim to enter upon the surface of a claim owned or possessed by another." You see therefore that the statute which it is my duty to construe to you, declares that there are two classes of mineral deposits—of mineral lands, which the government owns, and which it proposes to sell or license the use of, and that the one class is determined by description, and the other by inclusion of all others except that which is thus described, and in order that there may be no mistake about that which is described, it uses two or three phrases, veins, lodes or ledges. Now I do not know that I can better define what is a vein, lode or ledge, to you than has already been done by my associate on the Supreme Bench, brother Field, whose learning on that subject, is equal, perhaps, to that of any judge of the United States Courts, and whose dilligence and precision are equal to his learning. Without going over all that he says about it, most of which was read to you by Mr. Symes, I adopt and instruct you that, "a continuous bed of mineralized rock lying within any other well defined boundaries on the earth's surface and under it, would constitute a lode, and that the term is used in the acts of Congress, as applicable to any zone or belt of mineralized rock, lying within boundaries clearly separating it from the neighboring rock. It is any class of deposits of mineral matter coming from the same source, impressed with the same forms, and appearing to have been created by the same process." In applying that definition to the body or sheet of mineralized matter which

has been the subject of this controversy, I think you will have very little difficulty in determining whether it is a vein or lode or not—a continuous body of mineralized rock lying within any other well-defined boundaries; a zone or belt of mineralized rock lying within boundaries clearly separating it from the neighboring rock; all deposits of mineral found throughout the mineralized zone or belt, coming from the same source, impressed with the same forms, and appearing to have been created by the same process.

I say to you further, gentlemen, that the thinness or thickness of the matter in particular places does not effect its being a vein or lode; nor does the fact that it is occasionally found in the general course of this vein or shoot, in pockets deeper down in the earth or higher up affect its character as a vein, lode or ledge. I say to you, further, that a total interruption of the ore matter, if the contact remains on each side, the limestone and porphyry are still preserved, and the vein or mineral matter is found within a short distance further on, pursuing that same contact, it is still a part of the same vein. In short, if there is a general and pervading continuance of this mineral matter with a casual and occasional interruption, but pursuing the same general course bounded by the same rocky material above and below as far as you can trace that until it breaks off totally and is interrupted for a very large distance, it is a vein of rock or mineral matter. Now I think you will have no difficulty in applying these definitions, since the evidence here is almost uncontradicted that there is such a sheet of matter as is spoken of. All the witnesses agree that there is a substratum of limestone and a superstratum of poryhyry; all agree, even defendant's witnesses, that they come to a point where that contact is so narrow that only a sheet of paper could be got into it, but still it has the well preserved distinction—the porphyry above, the lime below, and, al-

though in some instances to the south, some to the north and some occasionl spots in the levels, it is stated by the defendant's witnesses, that no more vein matter has been found; yet you must, I think, come to the conclusion that on the whole, and taking the course which this matter is in contact from the line of the plaintiff's location to the line of the defendant's location; taking the course of that large incline shaft, driven by the plaintiffs from where they first discovered it to where it meets the defendants, it is for you to say from the testimony, not for me to find for you, but I can see no reason why you should not say, there is a continuous vein of mineral from the opening shaft, the plaintiff's shaft, to the point where it reaches the Williams shaft. If that is true—if you find that to be true, why, notwithstanding these casual interruptions in various directions, notwithstanding the widening, the narrowing, the deepening and the shallowness of the vein, notwithstanding it has, in some places, acknowledged diversions down into the ground, still, if the miner is able to pursue and has been able to pursue it in the vein, notwithstanding these interruptions, you are to call it a vein, and treat it as a vein within the meaning of the act of Congress.

Geologists define a vein to be a fissure in the earth's crust filled with mineral. But they have found deposits of ore which should be classed as veins and which they admit this definition does not describe.

"The terms lode or mineral vein, commonly regarded as synonymous, are usually taken to mean the mineral contents of a fissure * * * * I have endeavored to show in paragraph II that the Great Flat Lode is, in the main, *a band of altered rock*. Much of the vein-stone extracted from some of the largest Cornish mines, such as Dolcoath, Cook's Kitchen, Toncroft, Carn Brea, and Phoenix, for in-

stance, closely resemble the contents of the Great Flat Lode, and was probably formed in a similar manner; indeed, I question very much whether at least half the tin ore of the country is not obtained from the tabular masses of stanniferous altered granite. If, then, many of the important lodes of such classic ground as Cornwall do not satisfy the common definition, one of two things ought to be done; either the miner should give up the term lode for these repositories, or else the meaning attached to the word by geologists should be extended. I need hardly say that the first alternative is not likely to be adopted; nor do I think it is one to be recommended * * * * I should propose, therefore, that the term lode or mineral vein should include not only the contents of fissues, but also such tabular masses of metalliferous rock as those I have been describing."

Paper on the Great Flat Lode in Cornwall, in the Quarterly Journal of the Geological Society for August, 1878, by Dr. Foster.

Sections 2320 and 2322 of the Revised Statutes refer to *vein, lode or ledge of rock in place* bearing gold, silver, lead, &c.

Sec. 2322, which Mr. Justice MILLER says is the important section, begins: The location of all mining locations heretofore made, or which may be hereafter made, ~~or~~ any mineral vein, lode or ledge situated on the public domain," &c.

To quote from another:

The ledge of rock in place contemplated by the law, in the case of Ruby Hill, is plainly the limestone zone. That it is a fissure vein nobody ever pretended. That its not being a fissure vein could prevent its being located and held under United States law, nobody ought to have pre-

tended. It has been asserted by interested persons, that the application of this principle will unsettle many mining titles. This is not true. There is nothing in the idea that whole mountain ranges or mining districts must be held to be single veins. The courts will continue to investigate facts; and when the facts interpreted by common sense, prove a given zone of rock, to be in the practical sense and for practical purposes a vein, they will not feel bound to call in learned geologists to say whether it is a fissure vein."

This Eureka ledge is nothing like so wide as the Comstock Lode; and the former is about one mile long, while the latter is about four miles in length: and it is a part of the history of the country that after expensive litigation, the titles upon the Comstock, all of which antedate 1872, were generally settled by each claim owner having so many linear feet of the lode for its entire width, with parallel end lines across and at right angles to its course; the exceptions being as to end lines and not as to width, in a few special cases of purchase, or where the first locator established for himself end lines not at right angles to the lode or permitted, by acquiesence and consent or otherwise, some subsequent adjacent locator to establish a boundary end line not at right angles to the course.

Consider the consequences of the Richmond position and of not holding this Eureka zone of mineralized rock one ledge. Imagine about five hundred different companies, groping like gophers on each separate stringer of ore between the quartzite and

shale—what a pandemonium their underground fight would make?

The miners themselves have attempted to avoid this. From east to west in regular order and succession we have the Jackson, the Phœnix, the KK, and the Eureka, claiming the zone as a lode—each so many linear feet of it for its entire width—and the Richmond on the west of the Eureka, alone trying to establish this new and revolutionary theory!

IV.

The Agreement.

Whether there be one lode, as found by the court below, or two lodes, and no matter what may be the course of the lode or lodes, the Richmond Company is bound by agreement and deeds to the westerly side of the line W X extended along the dip of the lode, which would be through "C" on map marked "map of the Eureka Mines and adjacent mines;" and if it ever owned anything on the easterly side thereof, has conveyed it to the Eureka Company.

I.

The findings show that on the 26th day of April, 1871, the Eureka Company made, to a company called the Richmond Mining Company, which then held the Richmond claim, a deed of the triangle cut-off in the southwest corner of the Champion by the line extending southerly from the letter *W* on the

maps, to the south side line of the Champion, and in said deed are these words, viz.:

"The above described triangle is ground claimed by the Richmond Mining Company as a part of their original location, and was included within the survey made for the Eureka Consolidated Mining Company. But it is expressly understood and agreed that this deed does not convey or quitclaim, or release any ores, precious metals, veins, lodes or deposits, dips, spurs or angles not embraced within the above-mentioned boundaries; and that the party of the second part agrees and covenants for itself, its successors and assigns, to make no claim hereafter to any ground or ore or metals therein embraced within the Nuget, Champion, Lookout, At Last, Margaret, and other mining claims and locations now owned and possessed by the party of the first part, except as to that contained within the limits of the above-described triangular piece of ground." (Record, Law Case, page 69.)

That is a recognition of the surveyed Champion northwest end line, and it explains the course of the line *X*, *W*, *R*, from *W* to *R*. It is a deed of the mere triangle with boundary lines drawn down vertically, and not including any dip outside of them.

The Richmond Mining Company afterwards conveyed the Richmond claim and this triangle to a grantee, who afterwards conveyed it to another, and so on, until the title is now vested in the Richmond Company of this case.

The findings also show:

"19th. That prior to the 16th day of June, A. D. 1873, the plaintiff was the holder of the Lookout patent hereto

annexed, marked exhibit "L," and the owner of all the mining ground and the rights and privileges thereby granted; and there was a controversy between the plaintiff and the defendant, in which the defendant claimed that by virtue of a location upon which said Richmond patent was afterwards issued, it was entitled to follow that portion of said lode afterwards granted by said Richmond patent, under the surface ground granted by said Lookout patent, and indefinitely in its dip drawn downwards, and thereupon the agreement hereto annexed, marked Exhibit X, and the deeds hereto annexed, marked Exhibits Y and Z, and made a part hereof, were duly executed and delivered to the respective parties."

21st. That the dividing line between the parties mentioned in the annexed agreement marked X, and mentioned in their respective deeds, extended downwards in a direct line along the dip of the lode, places the mining ground in dispute on the northeastly side of the line, and the deed of the defendant to the plaintiff conveyed all the mining ground lying on that side, together with all the dips, spurs and angles, and also the metals, ores, gold and silver bearing quartz, rock and earth therein, and all the rights, privileges and franchises thereto incident, appendant and appurtenant or thereunto usually had and enjoyed.'

Record, Law Case, p. 31.

By the agreement, the Eureka Company agreed to convey to the Richmond Company, the Lookout ground and also all the mining ground lying on the northwesterly side of the line X, W, R, and to dismiss all suits against the Richmond Company; and the Richmond Company was to pay the Eureka Company $85,000, and to convey to the Eureka Company, "with warranty against its own acts, all its rights,

title or interest in and to, any, and all the land or mining ground situate in the Eureka Mining District aforesaid, on the southeasterly side of the line hereinbefore mentioned * * * and in and to all ores, precious metals. veins, lodes, ledges, deposits, dips, spurs, or angles on, in, or under the said land or mining ground or any part thereof. It being the object and intention of the said parties hereto, to confine the workings of the said party of the second part, (the Richmond Company,) to the northwesterly side of the said line continued downward to the centre of the earth, which line is hereby agreed upon as the permanent boundary line between the claims of the said parties."

See Record Law Case, pages 70–73.

The deed from the Eureka to the Richmond was in accordance with the agreement. Ibid., pp. 74–76. The deed from the Richmond to the Eureka, also in accordance with the agreement, conveyed "all the mining ground situate and being in the Eureka Mining District," and lying on the southeasterly side of said line, "together with all the dips, spurs, and angles, and also all the metals, ores, gold and silver, bearing quartz, rock, and earth therein—and all the rights, privileges, and franchises thereto incident, appendant and appurtenant, or therewith usually had and enjoyed." Ibid, p. 77.

By this agreement and deed, the Richmond conveyed to the Eureka all its title to land or mining ground *in Eureka Mining District* on the Southeast-

erly side of said line, and to *all* veins, lodes, ledges, and dips, on in or under said land or mining ground,

By saying land or mining ground on the southeasterly side of said line *in Eureka Mining District*, must have been meant, all land or mining ground on the southeasterly side of that line extended to the limits of the district. But if construed most strictly against the grantee and confined to land and mining ground on the southeasterly side of the line stopped at *X*, still the grant of all veins, lodes, ledges and dips therefrom would certainly, in express terms, carry the line along the dip of the veins, lodes, or ledges as far as they extended.

By the terms of the agreement, it was the intention of the parties to make a permanent boundary line between their claims. There were the Richmond and Tip Top claims of the Richmond Company, and the Lookout—then conveyed to it—on one side of the line, and the Champion, At Last and Margaret or Lupita, of the Eureka Company on the other side. The Richmond and Champion, the most prominent, were vein or lode claims, and if upon the same lode it had its natural dip, and if upon separate and distinct lodes they had their natural dips. To make a boundary between them, from the very nature of such claims, it was and is necessary to have the line extended to the same extent that the lode or lodes extend dipping into the earth. Otherwise, the very object sought would not be obtained. Where a boundary line is intended between claims upon veins or lodes, and is partially fixed, it necessarily, and by

common intendment, extends itself with the dip, or it is no boundary line between the claims intended to be bounded. A lode-claim is a claim of all the lode to its greatest depth—of so many linear feet, and the dip therefrom as a unit.

This manner of fixing a line by two stakes about as far a part as the lode or ledge is wide, at or near the surface, was the custom of miners. It was adopted by Congress in providing that points should be marked on the surface not less than 25 nor over 600 feet apart. Such a line has always been understood to extend indefinitely along and with the lode or ledge on its dip, and to designate the boundary of the claim at every depth and distance to which the lode or ledge may extend away from the points designated on the surface.

Again, at the time of this agreement, on the 16th day of June, A. D. 1873, the Richmond had not applied for a patent for its Richmond or Tip Top claims.

So, among the terms of the agreement, it was prescribed: "And the said party of the first part (the Eureka Company) further agrees not to protest against or put any obstacle in the way of the party of the second part (the Richmond Company) in their application for a United States patent to the Richmond or other veins or lodes, provided such application do not conflict or cross the aforesaid line agreed upon."

Under this agreement the Richmond Company having applied for and obtained its Richmond and Tip Top patents without opposition from the Eureka Company, cannot maintain the right under the act of

1866 to cross said line or conflict with any right of the Eureka Company on the southeasterly side of said line.

The terms of the agreement that the Richmond should convey to the Eureka all its right and title to *all* veins, lodes, ledges, and dips on the southeasterly side of said line and the deed in accordance therewith, and the agreement that the Richmond might patent the Richmond or other veins or lodes, not conflicting with the Eureka claims, shows that this boundary line between the coterminous owners should be *the* line, whether there were one lode or ledge or more than one, and no matter what the course of said lode or lodes or ledge or ledges, might be, and whether the line was at right angles to the course or not—the line being an arbitrary one—agreed upon by the parties no doubt, though, as being at right angles to the course, and being the actual dividing end line of the patents of the parties.

By this agreement and deeds it was intended to settle all controversy and make a permanent boundary line between the claims of the parties.

To quote from another: "The parties must be considered as having intended to divide and establish a boundary line to the whole extent of the ledge or subject dealt with. Otherwise, how is the controversy settled? The controversy is otherwise simply complicated; because, when we have got a line running half way across the body of ore, it cannot be seen how you are to manage with the balance of it. What reasonable solution is there of this difficulty

other than to extend the line? The theory of * * the other side is that when they have gone by the stake they may come around it and get ores on their neighbor's claim."

Respectfully submitted.

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THE EQUITY CASES.

If the judgment in the law case is affirmed, and it is thus finally determined that the title to the mining ground in controversy is in the Eureka Company, and not in the Richmond Company, nothing is to be done in the equity cases, except to confirm the decrees of the court below. One of these decrees enjoins the Richmond Company from working on the said premises; and the other dismisses the bill of the Richmond Company for an injunction to restrain the Eureka Company from working thereon. Equity must follow the law and support the legal title.

If, however, for any purpose the Court should consider the evidence, we present this review of it, and also some matters derived from it, concerning the questions already discussed in the foregoing brief in the law case.

I.

As to the Agreement again.

At the northwest end of the Eureka Fifth level a body of ore is exposed by that level under the surface of the Margaret or Lupita patent and within the lines of that patent drawn vertically down. See the maps.

This orebody lies directly under the line *W X;* it being developed to a greater extent, as the evidence shows, than is represented on the maps.

Mr. King, witness for the Richmond, says "in the region of the letter M (in word Margaret on map of Richmond) within the claim of the Margaret I encountered a body of ore lying in the contact, upon the quartzite. * * Down from this point the ore continues further than is marked on this map, out to this compromise line or nearly touching the compromise line." Record p. 552, folio 895. Then continuing down to words "Judge Hillyer," on page 554,

in folio 897, King describes this orebody extending in the works shown on the map across the compromise line, extended, to figure 48 at the end ot the Richmond Fourth level, where it connects with a fissure, which he says connects above with the Richmond fissure.

Again: "Q. Coming on down here you say that there is a connection between the fissure and the Fifth level orebody of the Eureka?

A. Yes, sir, there is a fissure connection with the Fourth level.

Q. And you believe that that is a part of the Richmond vein or lode, as you call it?

A. I believe that is a spur of the Richmond lode.

Q. And consequently a part of it?

A. Yes, sir."

Ibid page 560, folio 907.

We produce five witnesses, Messrs. Read, Keyes, Raymond, Sterry Hunt and James, with assays of samples taken all along from the Fifth level to the Potts chamber to prove the continuance of this Fifth level orebody to the orebody partially worked out in the Potts chamber—showing that they are parts of the same great and continuous orebody.

Read, testifying on Eureka map, p. 74, folio 95; p. 76, folio 99.

Keyes, page 169, first question and answer; p. 156, last part of folio 230 and folio 231.

Raymond, p. 216, folio 332.

James, pp. 317–318, folios 501–502.

Hunt, p. 286, folio 449, last sentence before cross-examination; in which is a misprint to wit, "1,000," but the sense plain, and details of the tracing given before on same and preceding page.

Samples taken by Keyes and James, pp. 165–6; 317–318; assayed by Falkenan & Reese, pp. 273–4.

And we have a virtual confession of this tracing by Ashburner, pp. 534–5, folios 855–856, who admits low-grade ore all the way from Fifth level orebody to Potts chamber, but says it is too low grade much of the way to be considered ore in an economical point of view.

Wescott traces an ore connection from the Ninth level orebody to Potts chamber, p. 404, folios 641–2; and follows the rich ore from Fifth level Eureka to Fourth level of the Richmond, as King did.

The body of ore found at the west end of the Eureka Fifth level is within the lines of the Margaret claim. Suppose, as is urged by the Richmond, that it is not a part of the Eureka lode but is a part of the so-called Richmond vein. Then at any rate it was conveyed by this agreement deed of June 16th, 1873, by the Richmond to the Eureka Company, *with its dip*, and we have the right to follow it on its dip, either wherever it goes on its dip, or at least whenever it goes on its dip on our side of the line W X, extended as far as the vein or orebody extends.

As it goes on down from the Fifth level to the Ninth level and embraces the Potts chamber, we clearly have all the Potts chamber and adjacent ore on the southeasterly side of the line by *the very terms* of the agreement and deed.

II.

Further, as to the Agreement.

We have seen in the law case that there was a controversy between the Richmond and Eureka Companies, in which the Richmond claimed that by virtue of a location upon which said Richmond patent was afterwards issued, it was entitled to follow the Richmond lode under the surface ground granted to the Eureka Company by the Lookout patent.

The Lookout patent was issued upon a square location, 400x200 feet. (Record Law case, p. 63.)

This location was permitted by the amended laws of the district (Record law case, p. 34), passed when it was supposed there were some deposits, as well as veins or ledges, in the district.

The Richmond was both a square and a ledge location. (Ibid., p. 62.) The Eureka sued the Richmond for working in ore under the Lookout patent lines. The Richmond contended it was working down on a lode which had its apex in its location.

Mr. Clarence King was then an expert for the Richmond, and on the then developments and croppings, testified that the formation was a lode extending along in Tip Top, Richmond, Champion, Buckeye, K. K., Phœnix, and Jackson—as we now contend.

Record Eq. cases, pages 546–7, folio 875; pages 557–8.

The Eureka Company, on this testimony, agreed that that was the geological fact; that it was a vein or lode so extending from Tip Top to Jackson, and upon that testimony and conviction made the agreement of compromise conveying the Lookout to the Richmond Company for a small sum, and establishing the line *X. W. R.* as a permanent boundary on the vein or lode.

Now, the Richmond has again worked down underground in a part of the lode claimed by the Eureka Company under that agreement and its patent; and to avoid responsibility, attempts to prove that the lode of the Richmond and Tip Top locations, and subsequent patents does not so extend through the Champion, Buckeye, &c., but is a separate lode with a different course from that of the Champion and Buckeye, and is attempting to prove it by Mr. King, who says he has changed his mind on the subject; which change of mind we will now consider.

III.

Testimony of King, page 545, last answer in folio 873; page 546, folio 875.

To save some vestige of his former testimony, he says that on the former trial he said the Richmond was a pipe vein, and that he says so still.

Then he had it a chimney, shoot or pipe of ore, a part of a vein or lode extending for over a mile on the surface from Tip Top to Jackson; then by calling the Richmond ore-body a *pipe vein*, he meant to use the word vein as an interior seam or fissure in the great vein, as the word is, indeed, sometimes used—as by himself in his book upon the Comstock. Speaking of the Comstock, page 39, Vol. 3 Exploration of the Fortieth Parallel: "While the vein, as a whole, can only be regarded as a true fissure," &c. Page 40: "Both these fissures are more or less filled with

continuous veins of quartz," &c. Page 57: "The east veins at this point were barren," &c.

Now, by calling it a pipe vein, on his new theory, he applies the term to what he wants considered an independent separate vein or lode.

Without course or dip, this ore body of the Richmond pitches down into the earth. The dip of a lode is its inclination into the earth at right angles to its course; so, if it has no course it can have no dip. How, then, can it be a lode? Is it not, as King first described it, a pipe, or chimney, or shoot of ore in the lode that courses along through the Tip Top, Richmond, Champion, KK., Phœnix and Jackson?

Between the time Mr. King testified before, and his testimony on the trial of this case, the 5th level ore body which our witnessestrace on down to the 9th level orebody and the Pott's chamber, and so over 500 feet on the quartzite contact, and the body of ore at point marked "winzes" on Eureka map, between Champion and Richmond croppings, have been discovered, yet he changed his mind, and now considers the Richmond no part of the vein or lode extending along in the Champion, Buckeye, KK Phœnix and Jackson. We have come very near showing him ore from Champion to Richmond croppings; but the more ore we show him there, the less chance he thinks there is for vein continuity.

Since the commencement of this suit, and before the trial exploring works towards and at the west end of its claims were pushed, as the testimony shows, by the plaintiff, with great activity. All the levels of plaintiff, from the Lawton shaft, have been driven to the west, along or near the line of contact between the quartzite and limestone. And before this suit plaintiff had been for some time driving westward its ninth level to reach its ore, which it was suspected the defendant was secretly taking out underground, contrary to right and against the terms of compromise and agreement it had made with defendant.

In pressing these levels to the west, no time was taken for much exploration in the body of the lode. Heretofore,

plaintiff was working its ore bodies, near its shaft, at the east end of its claims. Between these ore bodies and that ore body at the west end of plaintiff's claims the defendant alleges there is a barren belt of limestone without ore in it for about 600 feet. Now it would be more appropriate to say that this is an *unexplored* belt of limestone. Mr. Ashburner admits, (p. 517–18, folios 827, 828.) as all must know, that at any point in that limestone we are likely to find bodies of ore, and that in the levels in the belt said to be barren at many places small bodies of ore and matter discolored by the oxide of iron are found. Some of them admit that this oxide of iron is the gangue of the lode, and that it is an indication of ore bodies near at hand. The gangue accompanies the bodies of ore in a lode. As you approach a body of ore, this oxide of iron gangue becomes a deeper red color, and expands in diameter and increases in value until it becomes part of ore the body itself. On Mr. Read's map are lines of red shading along the drifts, showing where ore stains, low grade ore and bunches or bodies of ore are found in this alleged barren belt. Upon exploration, we may judge, from these indications and from the general character of the limestone zone (which led Mr. Ashburner to say that we might anywhere in it expect, at any place, to strike a body of ore), that we will find, in that belt we passed through hurriedly to reach and protect the west end of our claims and to trace the ore there, as many large bodies of ore as in any other part of the zone. It is now apparently likely, too, from the present developments, that the Potts chamber and Eureka 9th level ore body will extend easterly along the quartzite to the 9th level drift, to the winze leading down to the 10th level, and perhaps to the point of the cape at 9 G and 8½ A, where there is ore. Read, p. 73. f. 94.

Since this action was commenced, the defendant's witnesses testified to this same belt of barren limestone from the Richmond ore body to the ore bodies near the Lawton shaft: and since they so testified, the 5th level ore body has been found, that nothing was known of when they testified, in the very belt they were swearing to as barren. No man can swear correctly that it is a *barren belt*; it is indeed an *unexplored belt*, but a day may bring forth to view in it at any point bodies of ore. Suppose it should be held geologically a barren belt separating two pipe veins,

and that hereafter bodies of ore should be found in it on the quartzite: what injustice would have been done the plaintiff! We would have our Champion patent upon the croppings, with end lines at right angles to the course of the lode—the oldest patent—and we would have none of the lode beyond the point X, and the most of that under the compromise and not under the patent.

To call this a barren belt of limestone, you have to take it in its entirety: from the surface down and from the quartzite to the shale. If, so considered, there is ore to be found which would be cut by a section drawn across it at any and every point, it cannot be called a barren belt. Draw a line across the limestone from the quartzite to the shale between the Champion and Richmond croppings, and you can find no place where it will miss ore. Can our Champion croppings and the Richmond ore body be connected in ore? They are not so connected now but they are nearly so, and our witnesses give the opinion that they can be by proper tracing work. The witnesses for defendant think they cannot be connected. Our witnesses testify that the Champion croppings and Richmond croppings are of the same lode. Mr. King, in a case between the parties to this suit, tried four years ago, testified as an expert for the Richmond, that they were croppings of the same vein. Since that a body of ore has been found at point marked "winzes" on Read's map (between these croppings, Read, p. 61–2, f. 75–6), and the 5th level ore body has been found lying on the quartzite directly in front of the Champion croppings, and still with this additional development in favor of his then opinion, he now changes it. Then he said that the vein cropped at the Richmond, Champion, Buckeye, and Phœnix. He has not since examined the ground from the Champion to the Phœnix, and so must yet admit the cropping of one lode in those claims. Why then does that lode stop suddenly now before it reaches the Richmond? He gives as his reason for the change of opinion that the lower workings show a barren belt of limestone between the Richmond ore body and the ore bodies near the Lawton shaft. But that is only an unexplored belt of limestone! Suppose ore bodies should be found in it! Then a second time his testimony would be unjustly given and used against us.

But let us proceed to see if there is any such barren belt of limestone.

From the Champion croppings ore chamber, you pass into the Champion tunnel. This tunnel has two branches. They separate at the mouth of it and come together at the end, at the Shaw winze. The right hand branch at its end, passes through a chamber and stopes from which ore has been taken. This ore extends to the top of the Shaw winze. The chamber and stopes are put down from actual surveys made by Read several years ago, on his map. The top of the Shaw winz is 90 feet below the surface and almost directly north of the west end of the Champion chamber, and almost directly under the west line of the Champion patent and east line of the Richmond patent. You go down the Shaw winze 30 feet in ore and come to a chamber of the Richmond, extending from the winze into the Richmond ground ninety-one feet. This chamber is on Read's map. It is caved so that he could not take its complete dimensions.

Proceeding on down the Shaw winze to the bottom, still in ore, you come into an ore chamber. From this ore chamber you pass along a drift, in ore, to point marked "Winzes." The tops of these are in ore. There are four of them near together. You go down these in ore to within 29 feet of the bottom, at the Lizette tunnel. These winzes are 100 feet deep. From the bottom of these winzes you pass along in the Lizette tunnel for 60 feet of barren limestone; then you reach ore and follow it on, in the tunnel, to the main Richmond ore body. This is the testimony of all of our witnesses. The tracings are shown on Read's maps. The witnesses for defendant differ in these tracings from ours on immaterial points. They make the first ore in the Lizette tunnel 90 feet instead of 60, from the bottom of the winzes; and they say the drift from the ore body, at the bottom of the Shaw winze to the top of the winzes, is barren. Whitney does not testify as to these tracings—he did not observe them. The notes and memories of King and Ashburner were confused and defective, as to them, as they admitted upon the stand. Wescoatt has not upon his maps the right hand branch of the Champion tunnel, or the ore chamber stopes it passes through at the top of the Shaw winze, nor the Richmond ore chamber entered 30 feet

down the Shaw winze. These are the ore chambers, in red, on Read's map.

Neither did Mr. Wescoatt nor Mr. Read have upon their maps the easternmost ore chamber in the upper Richmond workings. They have placed it in pencil on them now from a former survey of Mr. Wescoatt and it extends to a point directly under the south side line of the Lookout patent and under the middle point of that line. Both maps show the Iron or Virginia shaft. At this all of our witnesses say is a cropping of the lode. Mr. Hague also calls it a cropping. As to whether any of the ore there was galena or not, the witnesses differ. At the west end of the 5th level of the plaintiff a large ore body is exposed. On the 23d of July Mr. Ashburner was in the west end of the Eureka 3d level, which is being driven to the west, and found oxide of iron in the end of it.

Now, laying down the map of Mr. Read and looking towards the north of it across these developments I have described, and you will see that a line cannot be drawn across parallel to the end lines of the Champion and Richmond patent without striking ore in the lode.

There are chimneys of ore in the Comstock stretching down into the earth separated by barren spaces of 1,200 feet.

Hague, p. 476, folios 759, 760, 761.

IV.

The evidence sustains the findings in the law case, as to this limestone zone, which the court below held to be a lode or ledge within the meaning of the act of Congress.

There is some controversy as the continuity of the clay or shale hanging-walls. At some places it appears near or on the surface and at points distant several hundred feet from each other, it is found by drifts which extend to it at various depths under ground. Its course and dip whenever found are not identical; but these are not so variable as those of the quartzite foot-wall, about the continuity of which there can be no doubt. It is not to be expected that its course and dip shall always be the same; but this is asserted as proof of its continuity, that it is found in

every drift, tunnel and shaft for over the mile of extent where it would naturally be expected to be found.

Read, p. 59, folio 71; p. 88, folios 118, 119, 120; p. 92, folio 124; p. 122, folio 173; p. 125, folio 178; p. 90, folio 121; pp. 120–125, folios 171–8.

It is marked blue on the map, p. 88, folio 118.

Keyes, p. 140, folio 203; p. 158, folio 234.
Raymond, p. 217, folio 333.
Hunt Passun.
James, p. 330–1, folio 522–3.
Hague, p. 460, folio 522–3.

There is also some little dispute as to the fissured, broken and disintegrated condition of the limestone between the quartzite and the clay or shale; but when they admit that it is only stratified in two places (places which escaped the operation of the crushing forces brought to bear upon the immense mass), they must concede the truth of the testimony of Raymond and Hunt, as to the original fracturing, and cave and crevice making, and recementing into solid unstratified form.

Also Hague, p. 460, folio 733.

That no considerable amounts or indications of ore have been found within a mile either north or south of the zone, is hardly any longer controverted, though several witnesses, who signally failed—Titus, Potts, Doolan, Davis and Williams—were introduced to disprove it.

Read, p. 92, folio 125; p. 105, folio 146; p. 95, folio 129–130; p. 96.
Keyes, p. 191, folio 289.
Raymond, p. 207, folio 316.

If any mines had been worked in the quartzite or north of the clay or shale, all the witnesses at the trial could have proved it.

That the limestone beyond the clay or shale, outside of the zone, is stratified,

Read, p. 93, folio 126; p, 95, folio 129.
Raymond, p. 207, folio 316; p. 217, folio 334.
Hunt, p. 278, folio 435; p. 295, folio 464.

There is one fact of great moment not found; *that in three places in the zone ore extends from the quartzite to the clay or shale, from wall to wall.*

Raymond p. 214–5, folio 329, 330. One point in the ckson, one in the K., K., and at the Potts Chamber.

The two first are not disputed. The third can hardly be considered disputed; and it is the Richmond ore body itself. It seems that this should settle the matter of one lode.

It is charged that this limestone zone is not a lode because the proportion of ore to limestone in it is small.

James says there is more pay ore to barren ground in the Eureka lode than in the Comstock.

(Page 330 folio 522.)

Again, the Richmond fissures and all fissures found in the zone are confined within it; there is no proof of any one extending into the quartzite or the shale; they are all *interior* to the persistent boundaries.

The course of the lode is parallel with the Champion side-lines.

See map of Richmond showing the course of the quartzite contact on the surface, and the cropping, etc.

V.

As to this being *one lode*, James, the expert of the Comstock says:

"Q. The only reason, as I understand you, why this is a vein is, that you find this ore disseminated more or less throughout this rock in various manners and forms, and that you find these walls dividing the different formations?

A. That is my reason mainly for thinking so. If I were working the mine, and found the walls well defined, and beyond the walls found the ore-bodies, I wouldn't go to any books to find out what it was called, I would call it my vein." (p. 333, folio 526.)

As to definitions in books of Geology, Keyes says: My conclusion, that this is one lode, is legitimate from Von Cotta. He starts out with an arbitrary definition of a vein and then shows a great many variations from it. He states that an example, pure and simple, is rare and difficult to

find; that they generally run into another, that the definition itself is very vague and general. I know of none of the European authorities that give the definition except with a great deal of explanation, and with a view to alter, explain and enlarge, as investigations extend. Page 191–2, folio 289–290.

Raymond says: I believe the deposit to belong to that class of deposits which have been by all writers at last separated from typical *fissure veins*: differing from typical *beds*; differing from typical *seggregations* and from typical *impregnations*. Because this class is found to contain instances, and single instances are found to contain indications of all those processes and variety of deposit, because it has been found practically absurd to discuss or define a deposit of such a character in one place as a lode, and in another place as a body, and in another place, impregnation, and in another place, seggregation, *all in the same*, which was the logical result of the attempts previously made, to bring the class under existing narrow definitions.

It is the class which is called by Von Cotta lead deposits in magnesian limestone. By force of logic it might even be classed as a modification of a fissure vein, since, in the geological sense, there was undoubtedly a fissure, a contact fissure, between the quartzite, its foot-wall and the limestone overhanging it, and it is bounded by two walls as the general shape of the vein. I prefer, however, not to attempt to force it into such a connection with the formal definition.

Present usage among miners, engineers, geologists and ~~their~~ authors, shows the force of the words "vein," "lode," "ledge" to go beyond the technical definitions. Thus we hear of coal veins; of the magnetite veins of New Jersey; of the copper veins of Ducktown, Tennessee, and many other cases in this country in which the ore deposits are admitted to be beds. Miners finding an out crop, call it a vein, or ledge or lode at once before they know more about it, and the name sticks to it in spite of subsequent explorations: nay, even the scientists themselves, after clearly explaining the technical sense of the term, drop comfortably into the popular sense.

See testimony of Raymond in full.

The following references are grouped together to show:

First. The nature of the definition of a lode, and the transition of one class of ore deposits into another.

Second. The adoption of the popular usage by authors who apply the terms vein and lode to deposits, not fissure veins and even to beds.

Thirdly. The peculiar nature of lead ore deposits in magnesian limestone.

Fourthly. The nature of pipe veins.

Cotta's Ore Deposits, (Prime's Translation, page 26, 155, 157, 178, 179, 182, 185, 252, 254, 269, 332, 333, 334, 338, 431, 432, 479, 497;

De La Beche's Geological Observer, page 644;

Whitney's Metallic Wealth of the United States, (Philadelphia 1854) page 40, 187, 189, 190, 273, 302, 303, 312, 322, 323, 324, 347, 361, 365, 370, 373, 374, 377, 378, 395, 412, 414, 432.)

Henwood on Metalliferous Deposits, part 1, pp. 619, 620.

This authority was quoted incautiously on behalf of the Richmond in the trial, because it mentions a "pipe vein;" but an examination of the passage shows the *pipe vein* to be included in a *lode* of limestone.

Posepny, official mineral geologists, connected with the geological survey of Austria, has written a late Treatise on the lead and zinc deposits of Carinthia. He says, page 390, under the head of Generalization of the Details:

"In the previous section I attempted to describe the occurrence and the inner structure of these deposits, and added some to the directly deducible inferences. We know already that these deposits represent the orey filling of preëxistent cavities in a dolomitic 'typhon.' This much [*i. e.*, the filling of preëxistent cavities] they have in common with all true veins; but what here appears for the first time with all clearness is, that these ores, as true geode formations, occur, not in the fissure space, but in the middle of the rock. Now, since there can be no doubt of the secondary nature of the formation as com-

" pared with the rock, the deposits must also be considered " as outside of the category of beds, and as forming a new " group, not yet regarded in the system of the Saxon " school."

With reference to the outer form of these deposits— " that is, the zones of rock, filled with the ore-geodes, &c.: (Same page.) * * " If I use for these two groups of " deposits the terms 'lode-like' and 'bed-like' I mean only " to designate the analogy in their outer form. The sin- " gle geodes, as well as whole groups of them, have the " character of 'stocks' (masses and networks); and since " their inner structure is one and the same, whether in the " lode-like or bed-like deposits, both forms of deposits may " be considered as composed of similar mass-elements, " which are distinguished on the large scale by their outer " form."

Professor Whitney, in his Metallic Wealth, page 374, speaking of the deposits of these mines of Carinthia, says:

" The ore is raised from the mines by means of cars on a " train road, laid down in an inclined shaft of large dimen- " sions, which dips with the *lode* at an angle of 52 degrees."

Here he calls the deposit described by Posepny *a lode.*

Cinnabar. The act of Congress provides for locating and patenting veins, lodes, or ledges of cinnabar; yet, Whitney says it never occurs in regular beds, but the great masses of this ore belong rather to the class of contact deposits. Page 595, p. 224, folio 344–5. The metallic wealth of the United States, pp. 40, 187.

VI.

The Richmond Company set up the theory that its body of ore is a *pipe vein.*

We contend, that this name, as applied in mining literature, hitherto refers not to a separate ore deposit, but to what we call an ore body or " chimney " of a certain elongated shape, lying in or connected with other ore deposits. The name comes solely from the shape.

Hague, p. 433–4, folio 689, 690.

It is applied loosely and indiscriminately to an ore body, as a pipe of ore, or a pipe vein in the books, and in the testimony of Hague, last cited, where he called this a pipe of ore and had to be led to call it a pipe vein. And, as we have seen in the book of Mr. King on the Comstock, and in the citations previously given, the word vein is often used in speaking of interior veins of ore within veins or lodes. It is this ambiguity, by means of which this ore body is attempted to be made a separate lode.

Respectfully submitted,

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